PROCEEDINGS & JOURNAL

OF THE

Agricultural and Horticultural Society of India.

For January-June, 1910

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1910

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THE

Agricultural and Horticultural Society of India.

The Minutes of the Annual General Meeting of the Agri.-Horticultural Society of India, held on the 29th January, 1910, at the Society's Garden, Alipore at 8 a.m.

Present.

H. C. EGGAR, ESQ., M.V.O., *President in the Chair.*

F. G. CLARKE, ESQ.
GEO. GIRARD, ESQ., F.R.H.S.
SHIRLEY TREMEARNE, ESQ.
G. B. McNAIR, ESQ.
F. H. EGGAR, ESQ.
N. S. WATKINS, ESQ.
BABU AMBICA CHURN LAW.
G. H. L. MACKENZIE, ESQ.

MAHARAJ ADHIRAJ SIR BIJOY CHAND MAHTAB BAHADUR, K.C.I.I.

C. W. WALSH, ESQ.
MONTAGUE MASSEY, ESQ.
F. B. SIDDONS, ESQ.
E. J. OAKLEY, ESQ.

F. H. ABBOTT, ESQ., *Secretary.*
SYDNEY LANCASTER, ESQ., *Asst. Secretary.*

The Minutes of the Meeting held on the 15th December 1908 were taken as read and confirmed.

THE ELECTION OF A NEW COUNCIL AND OFFICE BEARERS.

For the Year 1910.

President.

THE HON'BLE SIR BIJOY CHAND MAHTAB, MAHARAJ ADHIRAJ OF BURDWAN, K.C.I.E.

Vice-Presidents.

C. W. WALSH, ESQ.
JOHN DAVENPORT, ESQ.
SHIRLEY TREMEARNE, ESQ.
BABU AMBICA CHURN LAW.

Council.

F. G. CLARKE, ESQ.
M. MASSEY, ESQ.
J. A. SIMPSON, ESQ.
E. J. OAKLEY, ESQ.
RAJA PEARY MOHAN MOOKERJI, C.S.I.
GEO. GIRARD, ESQ., F.R.H.S.
G. B. McNAIR, ESQ.
G. H. I. MACKENZIE, ESQ.
SIR PRUDOYT COOMAR TAGORE, KT.
HAROLD MARTIN, ESQ.
H.H. THE MAHARAJA OF DURBHANGA, K.C.I.E.

F. H. EGGAR, ESQ.

The following gentlemen were proposed and elected as Ordinary Member :—

D. H. Lees, Esq., I.C.S., M. S. Tacomb Hood, Esq., Sreenath Misra, Esq., F. A. Lovell, Es., E. M. Slane, Esq., Norris L. MacDowell, Esq., Manager, Purtabpore Company, Ld., A. S. Napier, Esq., W. H. Blake, Esq., Managing Agent, Eastern Coal Company, Ld., Babu Kanai Lall Ghosh, J. McSwiney, Esq., I.C.S., Sir George Duff Sutherland Dunbar, Baronet Captain, I.A., Richard Mytton, Esq.

Rejoined—G. A. Davies, Esq., The Hon'ble F. A. Slacke, I.C.S., C.I.E.

The Minutes of the Adjourned General Meeting of the Agri-Horticultural Society of India, held on the 19th February, 1910, at 8 a.m. in the Society's Garden.

Present.

THE HON'BLE SIR BIJOY CHAND MAHTAB MAHARAJ ADHIRAJ OF BURDWAN, K.C.I.E., *President in the Chair.*

H. C. EGGAR, ESQ., M.V.O.
SHIRLEY TREMEARNE, ESQ.
GEO. GIRARD, F.R.H.S.
G. H. L. MACKENZIE, ESQ.
C. W. WALSH, ESQ.
E. J. OAKLEY, ESQ.
HAROLD MARTIN, ESQ.

F. H. ABBOTT, ESQ., *Secretary.*
SYDNEY LANCASTER, ESQ., *Asst. Secretary.*

The Minutes of the Council Meeting of the Agri.-Horticultural Society of India, held on the 12th March, 1910, at 8 a.m. in the Society's Garden.

Present.

THE HON'BLE SIR BIJOY CHAND MAHTAB, MAHARAJ ADHIRAJ OF BURDWAN, K.C.I.E., *President in the Chair.*

SHIRLEY TREMEARNE, ESQ	F. G. CLARKE, ESQ.
GEO. GIRARD, ESQ., F.R.H.S.	E. J. OAKLEY, ESQ.
C. W. WALSH, ESQ.	G. H. L. MACKENZIE, ESQ.
JOHN DAVENPORT, ESQ.	G. B. McNAIR, ESQ.

F. H. ABBOTT, ESQ., *Secretary.*
SYDNEY LANCASTER, ESQ., *Asst. Secretary.*

The Minutes of the last Meeting were read and confirmed.

The Minutes of the Council Meeting of the Agri.-Horticultural Society of India, held on the 2nd April, 1910, at 8 a.m. in the Society's Garden.

Present.

THE HON'BLE SIR BIJOY CHAND MAHTAB, MAHARAJ ADHIRAJ OF BURDWAN, K.C.I.E., *Presidnt in the Chair.*

SHIRLEY TREAMEARNE, ESQ.	C. W. WALSH, ESQ.
GEO. GIRARD, ESQ., F.R.H.S.	E. J. OAKLEY, ESQ.
G. B. McNAIR, ESQ.	G. H. L. MACKENZIE, ESQ.
F. G. CLARKE, ESQ.	BABU AMBICA CHURN LAW.
HAROLD MARTIN, ESQ.	JOHN DAVENPORT, ESQ.

F. H. ABBOTT, ESQ., *Secretary*
SYDNEY LANCASTER, ESQ., *Asst. Secretary.*

The Minutes of the last Meeting held on the 12th March 1910, were read and confirmed.

The Minutes of the Special Meeting of the Council of the Agri.-Horticultural Society of India, held on the 18th June, 1910, at 7-30 a.m. in the Society's Garden.

Present.

THE HON'BLE SIR BIJOY CHAND MAHTAB, MAHARAJ ADHIRAJ OF BURDWAN, K.C.I.E., *President in the Chair.*

SHIRLEY TREMEARNE, ESQ.
G. H. L. MACKENZIE, ESQ.
E. J. OAKLEY, ESQ.
GEO. GIRARD, ESQ., F.R.H.S.
F. G. CLARKE, ESQ.
HAROLD MARTIN, ESQ.
J. A. SIMPSON, ESQ.

F. H. ABBOTT, ESQ., *Secretary.*
SYDNEY LANCASTER, ESQ., *Asst. Secretary.*

CONTRIBUTIONS.

Annual Report of the Department of Agriculture Bombay Presidency for the year 1908-1909. From the Director.

Season and Crop Report of the Bombay Presidency for the year 1908-1909. From the Director.

Report on the Trade carried by Rail and River in Bengal in the official year 1908-1909. From Government of Bengal.

Report on the Administration of Bengal during 1908-1909. From Government of Bengal.

Report on the Operations of the Department of Agriculture Madras Presidency for the official year 1908-1909. From the Director.

The Perak Government Gazette, Vol. XXII, Nos. 42-43, dated 30th October 1909 and 12th November 1909. Nos. 53 and 54, dated 24th and 31st December 1909. From Government of Perak.

Federated Malay States Government Gazette, Vol. II, Nos. 1-6, from 7th January to 18th February 1910. From Government of Malay.

The Agricultural Ledger, Nos. 5-6, 1908-1909. 2 copies each. From Government of India.

Bulletin of Miscellaneous Information Royal Botanic Garden, Kew, No. 1, 1910. From the Director.

Agricultural News, a fortnightly Review of the Imperial Department of Agriculture for the West Indies, Vol. IX, Nos. 201-203, from January 8th to February 5th, 1910. From the Director.

The Indian Forester, Vol. XXXVI, Nos. 1 and 2, January, February 1910. From the Editor.

The Philippine Agricultural Review, Vol. III, No. 1, January 1910. From the Director.

Appendix IV, 1909. Bulletin of Miscellaneous Information of Royal Botanic Garden, Kew. From the Director.

Bulletin of Miscellaneous Information, Royal Botanic Garden, Kew, No. 10 of 1909 and No. 2 of 1910. 2 copies. From the Director.

The Agricultural Journal of India, Vol. IV, Part III for July 1909 of Agricultural Research Institute, Pusa. From the Director.

Report of the Agricultural Research Institute and College, Pusa. (Including Report of the Imperial Cotton Specialist). 1 copy. From the Director.

Memoirs of the Department of Agriculture in India, Vol. II, No. 7 for May 1909. 1 copy. From the Director.

Memoirs of the Department of Agriculture in India, Vol. II, No. 8 for April 1909 and Vol. II, No. 9 for January 1910 and Vol. III, No. 1 for March 1910. From the Director.

The Agricultural Ledger, 1908, No. 2, 1 copy, and 1908-1909, Nos. 3 and 4. 2 copies of each. From Government of India.

Report on the Introduction of Improvements into Indian Agriculture. By the work of the Agricultural Departments. 4 copies, 1909. From Government of India.

Prospectus of the Agricultural Research Institute and College, Pusa. 1 copy. From Government of India.

Bulletin No. 15 of Agricultural Research Institute, Pusa for July 1909. 1 copy. From Government of India.

Agricultural News, a Fortnightly Review of the Imperial

Department of Agriculture for the West Indies, Vol. IX, Nos. 204, 205 and 206 for February and March 1910. 3 copies. From the Director.

The Indian Forester, Vol. XXXVI, No. 3, March 1910. 1 copy. From the Editor.

Agricultural Bulletin of the Straits and Federated Malay States, Vol. IX, No. 1 for January 1910. From the Director.

Bulletin No. 17 of Agricultural Research Institute, Pusa, January 1910. 1 copy. From the Director.

Federated Malay States Government Gazette, Vol. II, Nos. 7, 8, 9, 10, 11, from 4th March to 1st April 1910. 5 copies. From Government of Malay.

Statistical Returns with a brief note of the Registration Department in Bengal, 1909. 1 copy. From Government of Bengal.

Report on the Maritime Trade of Bengal for the official year 1909-1910. 1 copy. From Government of Bengal.

Agricultural Statistics of Bengal for 1908-1909. 1 copy. From Government of Bengal.

A Monograph on Wire and Tinsel Industry in Bengal for 1910. 1 copy. From Government of Bengal.

Proceedings of the Agricultural Conference held at Poona on the 29th and 30th September and 2nd October 1909. 1 copy. From the Director.

Report of the Season and Crops of Eastern Bengal and Assam for the year ending the 31st March 1910. 1 copy. From the Director.

Annual Administration Report of the Forest Department of the Madras Presidency for the twelve months ending 30th June 1908. 1 copy. From the Director.

Annual Administration Report of the Forest Department of the Madras Presidency for the twelve months ending 30th June 1909. 1 copy. From the Director.

Federated Malay States Government Gazette, Vol. II, Nos. 12 to 25 and 27, from 11th April to 24th June 1910. From Government of Malay.

Proceedings of the Agri-Horticultural Society of Madras, October to December 1908, 1 copy. April to June 1909, 1 copy. July to September 1909, 1 copy. October to December 1909, 1 copy. January to March 1910. 1 copy. From the Society.

The Indian Forester, Vol. XXXVI, April 1910 and May 1910. 2 copies. From the Editor.

Agricultural News, a Fortnightly Review of the Imperial Department of Agriculture for the West Indies, Vol. IX, Nos. 208, 209 and 211, 16th and 30th April and May 28th, 1910. 3 copies. From the Director.

Agricultural Bulletin of the Straits and Federated Malay States, Vol. IX, Nos. 5 and 6, May and June 1910. From the Director.

The Philippine Agricultural Review, Vol. III, Nos. 3 and 4, March and April 1910. From the Director.

PRESENTATIONS.

From Mrs. Seth Apcar, Ballygunge—

2 Aglaonema species.
1 Hedysarum coronarium.
A collection of 20 plants of sorts.

FROM THE CURATOR, BOTANIC GARDENS, NATAL—

1 *packet* seed of each of the following:—

Spathodia Speciosa.
Jacaranda mimosæfolia.
Juniperus Virginiana.
Mimosa rubicaulis.
Tristania conferta.
Acocanthera venenata.
Strelitezia angusta.
Cupressus funebris.
Pandanus utilis.
Owenia acidula.
Hymenaea courbaril.
Cocos plumosa.
Aralia elegantissima.
Cassia florida.
Raphiolepsis indica.
Erythroxylon coca.
Calliandra Tweedei
Erythrina caffra.
Tabebuia triphylla.
Oncoba Kraussiana.
Tecoma stans.
Bowiea volobulis.
Indigofera arrecta.
Antigonon leptopus.
Bauhinia Galpinii.
Bauhinia Petersiana.
Chlorocodon Whytei.
Dombeya spectabilis.
Tabebuia triphylla.
Carissa grandiflora.
Bauhinia picta.

Aberia caffra.
Dracaena Hookeriana.
Toddalia lanceolata.
Brunsfelsia americana.
Calpurnia lasiogyne.
Moraea iridioides.
Trichelia Dregei.

From Srijut Rash Behary Roy, Serampore—

2 *packets* Poivraea grandiflora.

From Royal Botanic Gardens, Sibpur—

2 lbs. Sweitenia mahogani.

From C. N. Crichton, Esq., Jalpaiguri—

2 Thevetia species.

SHORT NOTES AND DESCRIPTIONS OF PLANTS IN THE SOCIETY'S PRICE LISTS.

(Continued from Proceedings and Journal for July—December, 1909.

Additional notes from Members in various districts will be gladly accepted.

Macadamia (Proteaceæ) Queensland Nut—*ternifolia.* A tall shrub with very handsome foliage, bears a fruit somewhat like a walnut in general appearance and of agreeable flavour, in taste like a filbert. Propagated by seeds.

Macfadyenia (Bignoniaceæ) *uncinata.* A slender creeper of no particular merit, with flowers of a dark brown colour. Propagated by layers.

MAGNOLIA (Magnoliaceæ) Chumpa. Tall flowering trees or shrubs with sweet scented white or yellow flowers. Propagated by gootie, layer and graft.

fuscata. An evergreen shrub producing flowers very indifferently, yellow tinged purple.

grandiflora. The finest tall variety which bears pure white flowers very sweetly scented, and produce abundantly. The leaves are a deep glossy green with a rusty brown undersurface.

mutabilis. A tall shrub with very strongly scented cream flowers which perfume the air all around.

pterocarpa. A large tree bearing white strongly scented flowers, the size of a hen's egg.

pumila. A dwarf shrub with small sweet scented white flowers.

MALPIGHIA (Malpighiaceæ) Cocifera Barbadoes cherry. A tall shrub with small ornamental foliage like a myrtle and a small cherry like fruit which is borne in profusion. Flowers white or pink.

urens. Cowhage or Cow Itch Cherry. A dwarf shrub with pretty pale pink or purple flowers but rather ragged in appearance. Propagated by seeds and layers.

MANETTIA (Rubiaceæ) *cordifolia.* A very slender creeper of handsome appearance, bears small scarlet tubular flowers. Propagated by layers.

MANIHOT (Euphorbiaceæ) Tapioca or Cassava. *utilissima.* A tall shrub of ornamental appearance but grown for Tapioca, which is extracted from its thick fleshy cyclindrical roots.

Glaziovii. Ceara Rubber of Commerce. A well known

plant which is now largely grown for rubber? Propagated by seeds and cuttings.

MANTISIA (Scitamineæ) Dancing Girls or Opera Girls. *Saltatoria.* A dwarf Hedychium like plant with pale violet and yellow flowers. Propagated by division of roots.

MARANTA (Scitamineæ). A dwarf genus of ornamental leaved plants largely grown for their foliage. The plants like moisture and shade and several varieties die down in the winter season. The arrowroot of commerce is extracted from the tubers of *Maranta arundinacea* and there are some eighty or ninety varieties known. Propagated by division of tubers.

MAURANDYA (Scrophularineæ) *Barclayana.* A very slender creeper usually treated as an annual. The pretty violet purple flowers and handsome foliage are very attractive. There are many other shades of colour of this creeper. Propagated by seeds.

MEDINELLA (Melastromaceæ) *magnifica.* A very beautiful dwarf shrub, bears large drooping bunches of pale pink flowers containing dark purple anthers. Propagated by layers.

MELALEUCA (Myrtaceæ) *leucadendron.* Cajiputi Oil Tree. The leaves yield a limpid oil of medicinal value. The tree is very like the bottle brush (*Callistemon speciosus*) in general appearance only the leaves are wider and the flowers are white. Propagated by layers.

MELIA (Meliaceæ) *azadaracta.* Neem. The Margossa tree. A tall tree, the leaves and bark of which are of medicinal value. The trees are grown in malarial districts with good effects. The flowers are greenish and insignificant.

azaracht. Bakain. The Persian lilac. A very hand-

some flowering tree bearing large bunches of small sweet scented lilac flowers. Propagated by seeds.

MELOCANNA (Gramineæ) *bambusoides.* A reed like bamboo differing only in its seeds which are like small pears in appearance. Highly ornamental. Propagated by division or seed.

MELODINUS (Apocynaceæ) *monogynus.* A scandent shrub or heavy creeper bearing large bunches of white Vanilla-scented flowers, in appearance like the jasmine. Propagated by layers.

MEMECYLON (Melastromaceæ) Red Iron Wood, *edule* (*tinctorium.*) A tall shrub which is covered in March and April with small purplish blue flowers, highly scented, reminding one strongly of Macassar Oil. The wood is known as Red Iron Wood and the edible but astringent berries yield a blue dye. Propagated by seeds.

MENISPERMUM (Menispermaceæ). The Moon seed. *canadense.* A large heavy growing creeper, the chief attraction being the variegated leaves at the extremities of the branches. The flowers are small, yellow and produced in long racemes and the plant gets its name in allusion to the shape of the seeds. Propagated by seeds and cuttings.

MESUA (Guttifereæ) Nagesar or Nahor Champa. *ferrea,* the Iron wood. A tall tree with handsome shiny leaves and bearing sweet scented flowers in which the deep yellow stamens contrast finely with the white corolla. The plant is of very slow growth and is raised by seeds.

MICHELIA (Magnoliaceæ). Tall trees largely grown for their sweet scented flowers which are used for poojah purposes. The flowers of *champaca* are an orange yellow while

those of *alba* are pure white. Propagated by layers and grafts.

MICONIA (Melastromaceæ) *Hookeriana.* A handsome shrub very ornamental in appearance, the leaves are deep olive green with a broad silvery midrib. Propagated by layer and gootie.

MIMOSA (Leguminoseæ) Lajahi. Chui-mui. Humble plant. The Sensitive Tlant. *pudica.* A dwarf growing herb with pale pink acacia-like flowers. The leaves are very sensitive and close up at the least touch. Propagated by seeds.

MIMUSOPS (Sapotaceæ) *elengi* Mulsarai. A tall tree with very sweet scented flowers which are made into necklaces and used for poojah purposes. The variety *variegata* has its foliage splashed with white but is variable in its variegation.

indica Kkhirni. A large forest tree common to most parts of India, bears a small edible fruit which is greatly esteemed by the natives. Propagated by seeds.

MIRABILIS (Nyctagineæ) Gul-abas, Krishna Keli, Marvel of Peru, *jalapa.* This dwarf bulbous plant thrives well in any soil and produces a mass of flowers which are very variable in colour being white, yellow, crimson, or striped and blotched with two or more colours. They are known as "Four o'clock flowers" because they usually open late in the afternoon. Propagated by seeds and division.

MOMORDICA (Curcubitaceæ) *cochin-chinensis.* A heavy growing creeper bearing buff or straw coloured flowers with black purple spots at the base of three of the petals of the flower, followed by a fruit like a large scarlet Kurela. Propagated by seeds.

MONSTERA (Aroideæ) *deliciosa.* A heavy growing epiphy-

tic creeper with large leathery perforated and cut leaves. The fruit is luscious and of a pine-apple flavour. Propagated by cuttings.

MONBRETIA (Irideæ) *crocosmiflora.* A genus of bulbous plants with long narrow sword shaped leaves and handsome orange flowers. Propagated by offsets.

MORINGA (Moringeæ) Saijna. The Horse radish tree *ptergosperma.* A tall tree, the roots of which when young are grated and used like the Horse radish in Europe. The long unripe seed pods are cooked and eaten by the natives. Propagated by seeds and cuttings.

NIDULARIUM (Bromeliaceæ). Pine-apple like plants of very ornamental appearance and handsome leaves. Propagated by division.

NORONHIA (Oleaceæ) *emarginata.* A tall shrub with white flowers and handsome ornamental foliage. Propagated by layers.

NYCTANTHES (Oleaceæ) *arbor-tristis.* Harsinghar-Sephalika. The Tree of Sadness. A tall tree, the flowers of which are white with an orange tube. They open at the approach of night and fall off at daybreak. There are many pretty legends attached to this peculiarity. The flowers yield a saffron dye and are delightfully fragrant. Propagated by seeds.

NYCTACALOS (Bignoniaceæ) *Thompsoni.* A slender creeper bearing beautiful white flowers which open at night fall. Propagated by layers.

OCHNA (Ochnaceæ) Kanak chumpa, *squarrosa.* A tall shrub or tree producing a mass of bright yellow flowers during the hot weather followed by the red carpels and fruit receptacles. Propagated by seeds.

NAEGLIA (Gesneraceæ) *zebriua*. A handsome herbaceous plant the attractive feature being the dark velvety purplish-brown foliage. Propagated by division of bulbs.

NANDINA (Berberideæ). The sacred chinese bamboo *domestica*. A dwarf elegant evergreen shrub with handsome foliage. The flowers are white with yellow anthers followed by berries the size of peas. Propagated by seed.

NAPOLEANA (Myrtaceæ) *imperialis*. A tall shrub of no special merit. Its flowers, almost hidden by the leaves, are apricot and crimson assuming a bluish tinge when they decay. In shape and general appearance it is like the passion-flower. Propagated by layers.

NERIUM (Apocynaceæ) Rose Bay-Kunel. The Oleander. A small genus of flowering shrubs producing at the extremities of the rod like stems, bunches of white, pink or scarlet flowers in varying shades. The plants flower during the hot weather. Propagated by seeds and cuttings.

MURRAYA (Rutaceæ) Juti-Kamini, Chinese box. Well-known evergreens of handsome appearance bearing small white fragrant flowers in great profusion. Propagated by seeds.

MUSSAENDA (Rubiaceæ) Sada pata. Handsome ornamental shrubs chiefly grown on account of their large white floral leaves or bracts which are formed by the enlargement of one of the calyx segments. The flowers of the two varieties are yellow and orange. Propagated by cuttings.

MYONEMA (Chinconiaceæ) *multiflora*. A tall shrub bearing a mass of white flowers. Propagated by seeds.

MYOPORUM (Myoporineæ) *congestum*. A dwarf shrub with white scented flowers. Propagated by seeds.

MYRTUS (Myrtaceæ) Vilaiti Mendhi *communis*. The common myrtle so well known as to need no description. The flowers are white and the foliage has a pleasant scent. Propagated by seeds and cuttings.

OCHROCARPUS (Guttifereæ) *longifolius*. A tall ornamental tree of medicinal value. The buds yield a red dye while the flowers are delightfully scented. Propagated by seeds.

OLEA (Oleaceæ) *fragrans*. A very handsome ornamental plant with sweet scented white or yellowish flowers. Propagated by layers.

OPHIOPOGON (Haemadoraceæ) Snakes' beard. A small genus of grass like plants used for edging. Some of the varieties are variegated and others produce small lily-of-the-valley like flowers. Propagated by division.

OXALIS (Geraniaceæ) Amrul. Bulbous plants producing a mass of small bell-like flowers of various shades of colour, yellow, white, rose or purple. Propagated by division.

INTERESTING REFERENCES.

YIELDS FROM CEARA TREES WITH DIFFERENT KINDS OF TAPPING.

From the Agricultural News, Vol. IX., No. 210,

In Bulletin No. 19 of the Hawaii Agricultural Experiment Station, entitled *Experiments in Tapping Ceara Rubber Trees*, to which reference has already been made (see *Agricultural News*, Vol. IX, p. 107), an account is given of ex-

periments which were conducted with a view to ascertaining the difference of yield of latex, when V cuts were employed, from that obtaining when the cuts were vertical. In the first trial, ten trees were divided into similar groups of five. It was found that the time required for making the different kinds of incision was the same, being about seven minutes for each group. The trees tapped with a V cut gave $2\frac{1}{8}$ oz. of dry rubber; those with the vertical cut gave $6\frac{1}{2}$ oz. The greater yield in the latter case is partly due to the fact that the length of the incision with vertical cuts is greater than that with V cuts. The rate at which the latex ran from the vertical cuts was greater than that from the V cuts; the amount of scrap rubber left behind was about the same in each case. The healing of the bark took place in the same time in each case, and there was no difference in the smoothness of the surface of the renewed tissue.

Another experiment was conducted with twenty-five trees, which were tapped for five days in succession, fourteen vertical cuts 6 feet in length being made during this time, in each case. The purpose of this trial was to ascertain if there is any economy in making more cuts per day, and in this way using up the bark of the tree in a shorter time. The result was that no advantage was indicated from the use of four vertical cuts daily instead of two. The total amount of rubber obtained from the tree was 12·3 oz., of which 6·2 oz. was good, dry rubber.

A further experiment with eight trees at the station gave results again in favour of the vertical cut. These were not affected by the employment of a water bag to wash the latex into the pan and to keep the wounds fresh.

A USE FOR LEMON GRASS.

The *Journal d'Agriculture Tropicale*, No. 104, contains an account of a use for lemon grass that is under trial by the Government of Uganda. This consists in the cultivation of lemon grass, not merely as a source of essential oil, but as a prophylactic measure against sleeping sickness, which is especially prevalent among the natives who live on the shores of Lake Victoria-Nyanza. This plant, through the vapour of essential oil which it constantly produces, repels the greater number of insects, particularly the tse-tse fly (*Glossina morsitans*), by which the disease is transmitted.

From the account, it appears that the grass is cultivated as a border, about 300 yards broad, around the margin of the lake. Grown in this way, it improves the sanitary conditions, lessens the erosion of the soil, and yields, when cut, a profitable amount of oil. It is suggested that this use of the grass should be extended to other colonies in tropical Africa.

ESSAY ON COTTON CULTURE.

By P. Saunders, Esq., Govt. Cotton Commissioner.

From the Journal of the Agricultural & Horticultural Society, of India, Vol. XIII, Part I.

In writing this Essay I shall not adhere strictly to the Rules laid down by the Agricultural and Horticultural Society, because the expenses of experiments in one spot of ground, will not apply to experiments made in different parts of the country; and I believe I will meet the views of the Manchester Cotton Supply Association and the Agricultural

and Horticultural Society, if I write an Essay pointing out the best methods of culture of the cotton plant in the various large districts of this side of India, extending from the Sewalick range of Hills in the N.-W. Provinces to the confines of North Eastern Bengal. No part of this Essay will be derived from books, but from personal observation and study of the cotton plant, and the various soils in which it is grown.

For the successful cultivation of cotton in this or in any country, the cultivators must be acquainted with the leading conditions of soil and season necessary to that success; and, before touching upon the subject of cultivation, I shall describe these conditions.

Soil.

The soil for cotton may be sandy, as in the Jumna and Ganges Doab, and in the Hills of Assam, Cachar, and Chittagong; or it may be black, as in the Trans-Jumna territories, and many parts of Bengal; but it must be porous, and of a depth of not less than 3 feet. The taproot of the plant penetrates to a considerable depth, and if it encounters rock, gravel beds, or Kunkur beds, it fades and dies. The soils, in the countries mentioned, generally are deep, but occasional beds of Kunkur &c. occur which have caused the failure of experimental crops of Exotic seed, which failure has been attributed to soil and climate. At Newabgunge in Oude I observed a garden of exotic cotton in which the plants were dying after having attained a height of two feet. I noticed at once that the soil rested on a large bed of Kunkur, and explained to the cultivator that the moment the taproot reached the Kunkur bed it could find no further nourishment and the plant must die. He had already come to the conclusion that the soil or climate was unsuited to it. Soil of an

adhesive clayey kind is not suitable to cotton. There is much soil of this kind in Bengal, in some parts of Oude, the plains of Cachar, Assam, &c. In this soil the cotton grows, but it does not grow luxuriantly. The soil becomes baked and hardens rapidly round the plant, causing it to maintain a feeble existence, and the crop produced is scarcely worth gathering. Again the land must not be subject to inundation, as water lodging at the root of the cotton plant soon kills it.

Season.

The season for growing cotton must be observed and attended to. If we can get rain for ploughing and sowing, rain during the growth of the plant, rain while it is flowering, and dry warm weather for podding and picking, we obtain all the essentials for securing a fine crop of cotton. We have these essentials in almost every part of India that I am acquainted with, and when they do not exist in their entirety we have the command of irrigation to supply the deficiency. In the Southern States of America, which lie between the thirtieth and thirty seventh degrees of latitude, the Cotton planters are obliged to sow early—say in March or April, as they sometimes suffer severely from early frosts. But then they are exposed to heavy rains while the cotton trees are podding, and thus suffer much damage from early sowing. Our territories, which lie within the tropics, are not exposed to frosts, and we can select the proper time for sowing. In the North West Provinces the cotton seed should be sown not earlier than the 15th June and not later than the 1st of July. If the rains do not commence by the 15th of June or 1st of July, the land should be prepared and the seed sown by irrigation either from canals or wells. In this way the cotton will commence to pod about the end of September when the rains cease, and no climate in the world can be finer than the months of October, Nov-

ember and December in the N. W. P. for podding and the picking of the plant. The same may be said of Oude, Berar, and hills of Assam, Cachar and Sylhet, and Chittagong. In Assam, Cachar, Sylhet and Chittagong, however, spring rains commence in March, and the planter must not be tempted by these early rains to sow cotton. If he does, the cotton will be podding and ripening before the heavy periodical rains are past, and will be severely injured according to the greater or less severity of the rains. The planters in these countries ought not to sow their cotton before the 15th June. In the lower districts of Dacca and the Soonderbunds it may be proper to sow in October or in November, immediately after the heavy periodical rains cease. The heavy fogs and dews of the cold weather answer all the purposes of irrigation, and the cotton will flower and pod with the spring and summer sun; but the planters in the vast territory of India must select the proper season for sowing cotton according to the climate of the particular provinces in which they may be located, attending to the condition of climate and soil under which Cotton flourishes.

I have dwelt with particularity on these points, as I have seen exotic cotton sown at all seasons, and at any season; sometimes in February and March, and it then pods too soon, and is greatly damaged by heavy rains; sometimes in July and August and it then pods in the cold weather, and the flowers are few, and the pods small and shrivelled.

Exotic Cotton Seed.

The selection of good seed is a point of the greatest importance. Half the experiments in the country have failed from sowing bad seed. It is not easy to obtain good seed from America or Egypt, as it is liable to be damaged in the pass-

age, or from bad packing, or from bad preparation of the seed before it is packed. If India becomes an Exotic cotton growing country on a large scale, we must not depend upon imported seed. The seed from the exotic cotton grown by planters, especially if care is taken to select the largest pods, will do very well for a few years; and when a change becomes necessary the planter of the North West could obtain seed from N. E. Bengal and vice versa. Again exotic seed might be occasionally imported and sown in a field solely for the purpose of procuring seed. What I would impress upon planters is not to trust to imported seed to sow a whole plantation. If they do, and the seed proves bad, they lose the season. New Orleans* and Egyptian seed will be the best for the N. W. Provinces, Oude, Berar, and the teelas or hills of Assam, Sylhet, Cachar and Chittagong; while Sea Island seed will be the best for the Soonderbunds and the lowlands of the sea coast.

Preparation of Land.

The land should be well ploughed after the first rain, or after irrigation if rain does not fall in time. When ploughing is difficult or impossible it should be well hoed, and for that purpose I strongly recommend the hoe used by tea planters with long handles. The short handled shovel shaped hoe, used in the North West and other parts of India, is a worthless instrument.

*NOTE BY ONE OF THE COMMITTEE OF PAPERS.

This is doubtful. With deep cultivation on the sea soil, such as is found about Hazareeboug, Sea Island and Egyptian seed have been found to do better than New Orleans, sending down a taproot 18 to 20 inches.

Sowing.

Exotic cotton should be sown in lines four feet apart, and the seed should be deposited at a distance of three feet from each other. The best way to do this is to have lines of cord knotted at the distance required, (three feet) and to stick bamboo stakes in the ground at the site of each knot. Two coolies hold the line over the field, and one passes up, placing the stakes where required. After the ground is staked out the sowing should be commenced. With a hoe the ground should be turned up where the stake is inserted, and four seeds planted at distances about one inch from each other *in the line*, and about 1½ inches deep, and then they must immediately be covered with earth by the hand or with a small stick.

This method of sowing is easy and saves a great deal of trouble afterwards. It secures at once a good line, and saves the trouble of thinning and selecting the plants that must be thrown away, which is the case when seed is sown in the furrow. When the four seeds come up (supposing they all germinate) and grow to the height of seven or eight inches, it is easy to throw away the supernumerary plants leaving the best standing, for only one plant must be left in one point. The planter should prepare some thousands of bamboo stakes when the fields are ready for staking; and the stakes should be removed when the supernumerary plants are thrown away.

Weeding.

The planter will be entirely guided by the appearance of his cultivation to commence weeding. The first weeding, when the plant is small, should be by hand; but afterwards it will be found that the hoe or the plough does the double

duty of turning over the weeds and loosening the soil. In hoeing or ploughing the planter should be careful not to injure the lateral roots of the plant. As the plant grows up, ridging, or throwing a little fresh earth on the stem of the plant to a height of 5 or 6 inches at the time of hoeing, is very useful. When the rains are heavy this ridging prevents water from lodging at the root of the plant which is very injurious to it.

Irrigation.

Cotton is a plant that, although it languishes and dies when long inundated, must not remain long without moisture.

There are often breaks, as they are termed, in the periodical rains, that is intervals of fifteen, twenty, and even thirty days, when there is no rain. The plant must then be irrigated, or it will cease to grow and the crop will be very poor. In low moist lands irrigation may not be required, but the planter must judge of the necessity of irrigation by the appearance of the plant. Cotton in flower especially must have moisture, and I have seen so often, and in so many places, the benefits arising from irrigation, that I have no doubt of its great value. In my report on the Province of Oude, in the Section on Cotton, I give some experiences of the excellent results of irrigation.

Topping.

In this climate of powerful sun and heavy rain vegetation is most luxuriant, and exotic cotton is very apt to run to wood; and when this is the case it flowers very scantily. When the planter notices that the cotton is growing too high

before flowering, he should proceed down the lines with hedge-cutting scissors, and clip off the top of the main stem. This will check the upward growth, cause the plant to branch out laterally, and secure a good crop of pods.

Picking.

The pods should be picked when they are beginning to open, and after noon, when the morning dews are dried up by the sun. Picking should not be carried on in showery weather if it can be avoided; but if it is unavoidable, the pods should be housed apart and dried in the sun on the first opportunity. It will be advantageous to have two coolies on each line—one to pick the larger pods, to be followed by the other gathering the smaller that are left. In this way the separation of the qualities will be better kept, as one cooley with two boys would be constantly making mistakes and mixing the large and small together.

Cotton should be housed in godowns or bamboo sheds, with raised machauns or shelves of bamboo, on which to place the cotton. Cotton heaped on the ground gets dirty and often becomes damp and discoloured. Both colour and fibre suffer from dampness.

Cotton in Tea Lands.

I have long had an idea that the Tea planters of Assam, Sylhet, Cachar, and hereafter of Chittagong, would utilize their plantation by growing cotton in the tea lines. For two years the tea plant is small and requires shade, and during these years weeding must be constantly attended to, and adds much to the expense of the garden.

If cotton was sown in the lines, it would assist in shading the tea plants and keeping down weeds, and would not exhaust the soil any more than the rank vegetation which is constantly springing up in these countries. The cotton ought not to be sown between the lines for this would prevent hoeing, but after this fashion. Suppose the following are lines of tea six feet apart, and the tea trees, represented by O's, are four feet apart, then the cotton should be planted where the asterisks are.

O——*——O——*——O——*——O——*——O——*——O——*——O

O——*——O——*——O——*——O——*——O——*——O——*——O

In these tea countries hundreds of acres of new lands are being brought into tea cultivation, and I see no good reason why two crops of cotton should not be taken from them while the tea trees are young.*

Conclusion.

I believe that cotton cultivation will be very successful in India if the above rules are followed, and the conditions of soil and season are attended to. And I believe a short and simple Essay of this kind will be infinitely more useful than the most elaborate Essay on the history of cotton, and its numerous varieties. Of what importance is it to the practical agriculturist to learn that the knowledge of cotton is as ancient as history itself, that it has been mentioned by Herodotus, Pliny and Theophrastus, and that it

NOTE BY ONE OF THE COMMITTEE OF PAPERS.

I did this last year, and it answers very well for the Cotton, but it is *certain death to the tea.*

has been found by the first discoverers in America, and the first travellers in China? It would be of no practical use to the cultivator to describe the numerous varieties of the cotton tree, when the two mentioned will suit his purpose and are the most easily obtained. I will not touch upon these subjects, but send in the present little Essay, or treatise, or whatever it may be called, with no expectation of gaining prizes or medals, but in the hope of its proving useful, should the Agricultural Society think it worth printing and distributing.

P. SAUNDERS.

RAMIE (RHEA), THE NEW TEXTILE FIBRE.*

From the "Indian Industries and Power," Vol. VII., No. 10.

Of late years much has been written respecting the urgent need of flax substitutes, and of new fibres of proved value generally for textile manufacturing purposes; and it is recognised that the spinner and manufacturer, who is desirous of making profitable progress in his business, is bound to direct his attention to the same. Chief amongst vegetable fibres, which has attracted attention on this account is that extracted from the stems of the Rhea, Ramie or China-grass plant.

Ramie, which is known in India as "Rhea," belongs to the family of *Urtica*, and to the sub-division *Boehmeria*. While there are many varieties of the plant, two have been

* See "Reviews," page 388.

found to be the best fibre-yielding species. *Boehmeria tenacissima*, often called the green-leaved ramie, and *Boehmeria nivea*, called the white-leaved ramie on account of the silvery appearance presented by the undersides of its leaves. The *nivea* species is mostly grown in China, India and Formosa, and the *tenacissima* in Java, Sumatra, Borneo, Malacca, Mexico and other countries.

In modern commerce rhea and ramie are the vernacular names ascribed to the decorticated ribbons of fibrous bark, and China-grass assigned to the unbleached, though more or less clean, fibre. It is noteworthy, however, that some little confusion seems to exist over the nomenclature of the plant, and in this connection Sir George Watt, Adviser on Economic Products to the Government of India, has written: "It seems an error not only in fact but very possibly in the textile merits of the products concerned to speak of the Indian and Malayan fibres as rhea or ramie. These names are neither synonymous nor are the fibres in all probability derived from the same plant. It would be more in accord with the actual state of affairs to speak of rhea and China-grass conjointly, but distinct from rami, or ramie as it is sometimes written." "Chu-ma" (Tchow-ma) is the Chinese name for the plant. "Cay-gai" and "Pama" are given to it in Cochin China, while "Kankhura" or "Kunkura" is its most general name in Bengal, though in Bogra it is called "Kund" and in Jalpaiguri "Kurkunda." "Reeha" (Riha) is the Assamese name, and it is known as "Risa," "Rusa" and "Sumsha" in the Naga country. In the lower portions of the Assam Valley (Garo Hills, Kamrup, etc.) it is called by the Bengali name of "Kankura."

Boehmeria nivea (the species with which we in India are principally concerned) is a herbaceous sparsely-branched plant, with thick, succulent, soft hairy stems. The leaves

are broad, ovate, the apex acuminate, the margins coarsely dentate-serrate, the base truncate and only slightly drawn out into the petiole, but hardly ever shewing any tendency to be cordate. The veins in the lower half of the leaf are distinctly three, the midrib becoming pinnate above the middle. The under-surface is felted uniformly all over with silvery wool, in which only the midrib and the primary (or at the most the secondary) veins shew through the felted surface, and bear scattered, thick hyaline hairs. The stipules are large and persistent. The inflorescence is mostly much shorter than the petioles, thick and crowded with clusters of flowers. The fibres yielded are contained in that part of the stem which lies between the outer bark or cuticle and the inner woody core, where they are embedded in various gums and resins, surrounded by the outer bark. The plant was described for the first time under the name "Ramium Magus" by the Dutch Botanist Rumph, who discovered it about the year 1690 in the Island of Banoa, and specimens of it were brought to Europe in the eighteenth century. Dr. Buchanan Hamilton was the first authentic discoverer of *Boehmeria nivea* in India when he found it in Bengal in 1807, and in the following year christened it with the vernacular name of "Kankhura."

The fibre is reputed to have a strength greater than that of any other fibre, to be of remarkable fineness and to possess a lustre almost equal to that of silk. That of *Boehmeria tenacissima* is not quite so fine as that of *Boehmeria nivea*, but it is somewhat stronger. It spins well into yarn, but as the filaments are not so fine, the yarns cannot be spun as fine as those of the white variety. On the other hand, the latter, if not so strong as the former, has the advantage of being able to be spun into finer yarn, though more careful treatment in the manufacture is necessary. The difference in the relative filament length of the two descriptions is not great,

but the fibres of both are pliable, rendering them well suitable to compete with flax. The lengths vary from ·088 of a yard to 2·10 yards, according to the unfavourable or favourable latitudes in which the plant is grown.

Of machines for decorticating the fibre, it would appear as if, of those existent to-day, Lehmann's and Faure's are the most popular, the product as they are of many years of experiment. Of the former, two types are manufactured, the one a stationary machine for use in factories, the other, a movable one on wheels which permits of it being readily moved from one centre of operation to another. Faure's machines have been used in India on the ramie lands at Dalsingsarai in Behar.

When the bales of machine decorticated fibre arrive at the factory, the first process of manufacture which has to be carried out is that of degumming. The bales are, first of all, opened and the product is sorted into lots according to the different qualities of length, colour and freedom from outside substances. Lots of similar quality are then packed in kiers, such as are used to bleach cotton or vats, and the product is treated by steam, water and chemical agents in such a manner that the gum is eliminated. Washing-machines, hydro-extractors, squeezers, pumps, etc., are made use of in the course of the process in addition to kiers and vats. The degumming process is, of a necessity, a somewhat delicate one, as it is necessary that the strength, softness and lustre of the fibre should be the same after the operation as before. Once degummed, and before passing the filasse on to further processes, it is prepared in a special manner which has the effect of rendering it more elastic, and more capable of passing freely through all the different machines which are subsequently made use of in the course of manufacture. If the filasse is treated in a strongly prac-

tical manner in the initial stage, all following processes are so facilitated as to make the spinning of ramie a commercial success. Good preparation at this period and good combing afterwards are the two most important operations in the manufacture of the fibre.

After being degummed and prepared, the fibre, or degummed filasse, as it has now become, is fed by hand into a gill-spreading machine, the object of which is to transform it into slivers, which are then passed through a series of other gill-machines. The drawing of the fibres is the next operation, and this is carried out by passing the combed slivers through a series of gill-drawing frames running at high speeds. After leaving the drawing frames, the slivers or tapes are then transferred to the roving frames by which they are converted into rovings This roving process may be defined as a combination of drawing and twisting, with an excess of drawing, whilst spinning is a combination of the same processes with an excess of twisting. The screw gill roving frame employed will have about 40 spindles, though some have 24, and dandy roving frames with 100 have been used The rovings are then carried to the spinning frames. The wetring spinning frame generally used has some 300 spindles, with 2½″ pitch of spindles and 6″ traverse. Cleaning, gassing, reeling and bundling follows, and the yarn as it has now become is ready for weaving. Ramie yarns, it may be noted, will weave on any loom, though direct sunlight has a detrimental effect on the process, and it is, therefore, necessary to keep the windows of mills in which the yarn is being woven shaded.

The information given with regard to this interesting textile fibre, its cultivation, growth and manufacture has been taken from a recently published work entitled "*Ramie (Rhea), China-Grass, the New Textile Fibre*," by Mr. H. A.

Carter, which contains a voluminous and excellently illustrated history of the fibre, of the various technical processes which it must be put through to convert it into yarn, and of the numberless articles of commerce which it can then be subsequently woven into.

The work in question will, we imagine, take its place on the book-shelves of all those interested in textile matters as a standard volume.

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THE

ANNUAL REPORT

OF THE

Agricultural and Horticultural Society of India,

1910.

THE PRESIDENT'S REPORT

The Council of the Society have the pleasure at the close of another year to submit the Annual Report.

President.—The Hon'ble Sir Bijoy Chand Mahtab, K.C.I.E., I.O.M., Maharaj Adhiraj Bahadur of Burdwan

Vice-Presidents.—Shirley Tremearne, Esq., John Davenport, Esq., C. W. Walsh, Esq., Babu Ambica Churn Law.

Council.—Geo. Gniard, Esq., I.R.H.S., F. G. Clarke, Esq., G. B. McNair, Esq., F. H. Eggar, Esq., Montague Massey, Esq., G. H. L. Mackenzie, Esq., E. J. Oakley, Esq., H. H. the Maharaja Bahadur of Durbhanga, K.C.I.E., Raja Peary Mohun Mookerjee, C.S.I., J. A. Simpson, Esq., Harold Martin, Esq. and N. C. Sen, Esq.,

The number of ordinary members added to the list during the year was 23 as compared with 28 during 1909.

The resignations have been 19 as compared with 20 during 1909. The loss by deaths has been 3 giving a net gain of one member.

The resignations are due to the usual causes *viz.*, retirements from the country, and change of residence necessitating no further benefits to be derived from the Society.

Accounts.—The gross receipts of the Society for the year amounted to Rs. 36,128-1-2 as against Rs. 33,702-5-1 in 1909 showing an increase of Rs. 2,425-12-1.

Disbursements.—These aggregated Rs. 37,329-5-2 for the year, as against Rs. 40,500-1-10 during 1909, showing a decrease of Rs. 3,170-12-8.

Fixed Deposit.—The amount in the Bank at the close of 1909 was Rs. 20,200.

Aid.—The Council take this opportunity of again expressing their gratitude to Messrs. Mackinnon Mackenzie & Co., Messrs. Turner Morrison & Co. and Messrs. Apcar & Co. for their continued support to the Society in granting free conveyance by their steamers of consignments of seeds and plants to and from Calcutta.

Tennis Courts.—To make the gardens more attractive and generally useful the Council decided to

lay out the large maidan in the centre of the grounds in a Tennis lawn. The work in connection with this has been carried out, and the ground is ready, and can be used by Members. Rules for the use of the Courts have been compiled and issued. There are four Courts and a large Croquet lawn, occupying in all a space of 210 feet by 170 feet. All conveniences for the game with the exception of balls will be provided by the Society. Members must make their own arrangements for refreshments.

Acclimatised seeds.—The Government having issued orders stopping direct sale of seeds by the several up-country State Gardens, this work was undertaken as an experimental measure during the past season for the Saharanpore Gardens through the Agency of the Society, and will be continued for the ensuing season. It must however be understood that the Society takes no responsibility in connection with this in any way. A large quantity of seeds was received during the past season and have sold fairly well.

Seeds imported from Europe.—As complaints still continue to be received from Members of unsatisfactory results in connection with the seeds supplied them by the Society on their free allowance account, it was again decided to test in the Society's Gardens a case of all the seeds, vegetable and flower sent out by the growers Messrs. Sutton and Carter. The seeds were planted with the usual care and atten-

tion necessary and it is most gratifying to record that the result in every instance, was all that could possibly be expected. This conclusively shows that failure reported by Members of the supplies sent to them can only be from causes over which neither the growers nor the Society can have any control. It may also be mentioned that even old seeds kept over from supplies received in 1909, were tried and it was surprising to find that these even had still retained their germinating power to a remarkable extent; Peas, Beans, Cauliflowers, Cabbage, Lettuce, Artichoke, Beet, Turnips and Carrots germinated freely.

Propagation.—This was carried on as usual at suitable times throughout the year, and quantities of grafts of all sorts and kinds have been made for Members' requirements. Owing however to the excessive rain at the close of the monsoon, considerable damage was done to many of the young plants, which were killed. Consequently the available stock is some what more limited than in former years, still it is hoped, it will be sufficient for all reasonable demands.

Improvements.—Under this head, may be mentioned the grassing of the grounds hitherto laid out in beds around the Durbhanga House. This adds considerably to the neatness and appearance of the gardens. The raising and turfing also of the land to the east of the tank at the entrance of the

gardens has also been carried out, and adds much to appearance.

New General Plant Catalogue.—This Catalogue has been thoroughly revised and brought up-to-date. The different varieties of plants, trees, shrubs and bulbs have been placed under their proper and distinct heads, which will be found more convenient than was the case under the old arrangements.

The Cannon Ball Tree.—(Corou pita guianensis). This very uncommon tree, which is so prolific in the production of its peculiarly scented flowers, at last produced a gourd-like fruit, which on ripening gave some 80 seeds, but out of these only some half a dozen were fertile and germinated.

Camœnsia maxima.—A heavy creeper belonging to the Leguminosæ tribe and bearing large white flowers, has been flowering very indifferently for several years, in November last developed a change in its growth and showed signs of profuse flowering. Some hundreds of flowers opened and the opportunity was taken to fertilize them in hopes of obtaining seeds, but unfortunately with no result. We must therefore continue to resort to propagate by layers.

Barleria.—There are several varieties of this charming flowering shrub, the best and most remarkable being Cristata (pink mauve), Dichotoma (pink), Ciliata (white), and Striata (stripped mauve and white). These grow into fine bushy plants and pro-

duce masses of bloom about the end of January or early in February. Planted close together as a hedge they are most effective.

Hybrids.—The Hibiscus seedlings referred to in a former Journal, have now produced good results. Many have been named, and it is hoped to commence propagating from them during the year. The colors are varied, there being orange, yellow, terra-cotta, scarlet, white and several other beautiful art shades difficult to describe.

Cannas.—These have again yielded some very fine hybrid seedlings far surpassing any as yet produced in the Society's Gardens both in point of size of flowers as well as color.

Roses.—The new hybrids received from England still continue small and very delicate, which makes it difficult to obtain anything from them. Those plants produced in the Society's Gardens have not yet grown enough to be able to be judged on their merits, but from appearances promise well, and it is hoped will turn out new and good varieties.

Mr. Lancaster paid a visit to Agra in September last, and took the opportunity of inspecting the well-known Taj Gardens. He was fortunate in being able to obtain several new plants from there in exchange.

Statement of Receipts and Disbursements of the Agricultural & Horticultural Society of India from 1st January to 31st December, 1910.

RECEIPTS.	Rs.	As.	P.	Rs.	As.	P.
Cash Account—						
To balance in the Bank of Bengal	1,130	0	9			
„ „ on hand on 1st January 1910	187	8	11	1,317	9	8
Subscription Account—						
To admission fees and subscriptions	.....			10,729	3	0
Seed Account—						
To sale proceeds of native vegetable and miscellaneous seeds	1,532	5	6			
„ sale proceeds of imported and acclimatized seeds ...	4,559	13	6	6,092	3	0
Printing Account—						
To sale proceeds of publications...	.....			10	0	0
Freight Account—						
To sundry freights recovered ...	.....			1,184	7	6
Petty Charges Account—						
To packing and forwarding charges received	.....			1,551	3	6
Suspense Account—						
To amount at credit of sundry parties	.....			30	1	0
Interest Account—						
To interest on Grant Testimonial Fund	95	7	2			
„ „ fixed deposit ..	928	0	0	1,023	7	2
Garden Account—						
To sale proceeds of fruit trees, plants and flowers ...	5,553	3	3			
„ sale proceeds of boxes and pots	517	10	0			
„ packing and forwarding charges recovered	420	10	9	6,491	8	0
Flower Show Account—						
To amount received	.....			16	0	0
Fixed Deposit Account—						
To amount transferred to current account	.....			3,000	0	0
Extraordinary Receipt—						
To perpetual annuity from Government of Bengal ...	.....			6,000	0	0
GRAND TOTAL Rs. ...	.....			37,445	10	10

DISBURSEMENTS.	Rs.	As.	P.	Rs.	As.	P.
Seed Account—						
By remitted to Sutton & Sons ...	3,694	3	3			
,, Jas. Carter & Co.	3,015	9	2			
,, Watson & Scull...	88	5	0			
,, Ryder & Son ...	3	1	0			
,, Customs duty on seeds and clearing charges	336	1	0			
,, Cost of imported seeds locally purchased	12	14	0			
,, Cost of acclimatized, country vegetable and miscellaneous seeds	673	14	0			
				7,823	15	5
Establishment Account—						
By Office Establishment, from December 1909 to November 1910	.....			11,448	10	9
Library Account—						
By subscription to publications and books purchased also bound	.....			55	2	0
Advertisement Account—						
By advertising meetings &c. ...	.....			31	10	0
Stationery Account—						
By cost of sundry stationery and account books &c. ...	.....			55	3	6
Printing Account—						
By printing Proceedings and Journal	120	2	0			
,, printing miscellaneous Job work	280	4	0			
				400	6	0
Freight Account—						
By miscellaneous freight prepaid on plants, seeds &c. ...	.....			1,073	2	0
Fee Account—						
By auditors fee for auditing 1909 accounts	.....			50	0	0
Petty Charges Account—						
By postage on letters, Proceeding and Journal and V. P. Railway Receipts also Bank charges...	183	0	9			
,, cartage, cooly hire, landing and clearing charges, wax cloth, punkah cooly &c. ...	856	13	1			
				1,039	13	10
CARRIED OVER Rs. ...	.....			21,977	15	6

	Rs. As. P.	Rs. As. P.
BROUGHT FORWARD Rs. ...	.....	21,977 15 6
Garden Account—		
By assistant's salary, from December 1909 to November 1910	2,741 5 6	
„ Establishment and pensions	7,718 1 0	
„ Municipal assessments on Garden and House	808 4 0	
„ cost of boxes and pots ...	748 5 3	
„ cost of imported seeds and plants for propagation, tools, cloth for packing, carriage of plants, coir strings, materials for thatching plant houses &c.	1,698 10 3	13,714 10 0
Plant Account—		
By cost of plants purchased ...	.....	578 11 1
Interest Account—		
By commission charged by the Bank of Bengal for realizing interest on Grant Testimonial Fund	1 0 0	
„ interest on overdraft ...	9 7	1 9 7
House Repairing Account—		
By amount paid	.....	27 6 0
Survey Account—		
By amount paid	.....	300 0 0
Lawn Account—		
By amount spent	.....	455 2 6
Flower Show Account—		
By amount spent	.....	273 14 6
Cash Account—		
By balance in the Bank of Bengal	21 7 4	
„ on hand	94 14 4	116 5 8
GRAND TOTAL Rs. ...	.....	37,445 10 10

Summary of Receipts and Disbursements from

DISBURSEMENTS.	Rs.	As.	P.	Rs.	As.	P.
By ordinary expenditure as per statement	23,036	0	1			
„ garden expenditure as per statement	13,714	10	0			
„ plants purchased	578	11	1			
				37,329	5	2
„ cash balance in the Bank ...	21	7	4			
„ „ on hand ...	94	14	4			
				116	5	8
GRAND TOTAL Rs. ...	.....			37,445	10	10

1st January to 31st December, 1910.

RECEIPTS.	Rs.	As.	P.	Rs.	As.	P.
To opening cash balance on 1st January 1910	.....			1,317	9	8
„ ordinary receipts as per statement	23,636	9	2			
„ garden receipts as per statement	6,491	8	0			
				30,128	1	2
„ perpetual Annuity	.....			6,000	0	0
GRAND TOTAL Rs. ...	.....			37,445	10	10

T. C. MITRA,
Accountant.

F. H. ABBOTT,
Secretary & Treasurer.

Examined and found correct,
LOVELOCK & LEWES,
Chartered Accountants.

CALCUTTA, *10th April, 1911.*

Balance Sheet

LIABILITIES.			Rs. As. P.
Capital	.....		5,06,657 15 3
Liabilities—	£ s. d.		
Sutton & Sons	228 3 1		
Jas. Carter & Co.	165 18 0		
Ant. Roozen & Son	11 4 0		
E. Benary	5 13 10		
Watson & Scull	6 5 3		
Law Sommer & Co.	6 10 2		
Haage & Schmidt	4 5 3		
H. Cannell & Sons	3 18 6		
Benjamin Cant & Sons ...	1 5 6		
Watkins & Simpson	1 2 4		
F. C. Heinemann	12 4		
	£ 434 18 3		
	@ 1s. 4d. ₹ Re.		6,523 11 0
Sundry Creditors—	Rs. As. P.		
Office Establishment	953 0 0		
Garden Establishment ...	905 4 6		
Audit fee	50 0 0		
Miscellaneous bills	399 10 6		
			2,307 15 0
Suspense Account—			
Sundry credit balances ...	.....		30 1 0
Reserve against outstanding ...	.....		162 0 0
GRAND TOTAL Rs. ...	.....		5,15,681 10 3

as at 31st December, 1910.

ASSETS.	Rs.	As.	P.	Rs.	As.	P.
Landed Property—						
Buildings, plant houses, etc., at 17, Alipur Road	4,54,031	12	0			
Buildings, plant houses, etc., at 5, Belvedere Road ...	35,629	8	0			
				4,89,661	4	0
Outstandings—						
Garden 1909 Rs. 21 11						
1910 „ 2,438 11						
	2,460	9	0			
Subscriptions 1909 „ 100 4						
1910 „ 295 8						
	395	12	0			
				2,856	5	0
Grant Testimonial Fund—						
3½% Government Promissory Notes	2,800	0	0			
Interest accrued	47	11	7			
				2,847	11	7
Fixed Deposit—						
In Bank of Bengal @ 4% ..	15,000	0	0			
„ „ 3½% ...	5,200	0	0			
				20,200	0	0
Cash—						
In Bank of Bengal	21	7	4			
In hands of Secretary ...	94	14	4			
				116	5	8
GRAND TOTAL Rs. ...	.....			5,15,681	10	3

T. C. MITRA,
Accountant.

F. H. ABBOTT,
Secretary & Treasurer.

Examined and found correct,
LOVELOCK & LEWES,
Chartered Accountants.

CALCUTTA, *10th April, 1911.*

THE

Agricultural and Horticultural Society of India.

The Minutes of the Ordinary Monthly Meeting of the Council of the Agri.-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 6th August, 1910, at 7-30 a.m.

Present.

SHIRLEY TREMEARNE, ESQ., *Vice-President in the Chair.*

GEO. GIRARD, ESQ., F.R.H.S
F. G. CLARKE, ESQ.
HAROLD MARTIN, ESQ.
BABU AMBICA CHURN LAW.
RAJA PEARY MOHAN MOOKERJEE, C.S.I.

F. H. ABBOTT, ESQ., *Secretary.*
S. PERCY LANCASTER, ESQ., F.R.H.S., *Asst. Secretary.*

The Minutes of the Meeting held on the 4th June, having already been circulated to the Council, were taken as read and confirmed.

The following gentleman was proposed and elected as Ordinary Member:—

Mr. William Allen Ironside, Woodburn Park.

The Minutes of the Ordinary Monthly Meeting of the Council of the Agri.-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 17th September, 1910, at 7-30 a.m.

Present.

BABU AMBICA CHURN LAW, *Vice-President in the Chair.*

G. H. L. MACKENZIE, ESQ.

RAJA PEARY MOHAN MOOKERJEE, C.S.I.

F. H. ABBOTT, ESQ., *Secretary.*

S. PERCY LANCASTER, ESQ., F.R.H.S., *Asst. Secretary.*

The Minutes of the Meeting held on the 6th August, having already been circulated to the Council, were taken as read and confirmed.

The following gentlemen were proposed and elected as Ordinary Members:—

The Manager, Prithimpassa Wards' Estate, Ronald E. Bary, Esq.

Rejoined—The Manager, Kinderpati Indigo Concern.

The Minutes of the Ordinary Monthly Meeting of the Council of the Agri.-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 5th November, 1910, at 7-30 a.m.

Present.

SHIRLEY TREMEARNE, ESQ., *Vice-President in the Chair.*

GEO. GIRARD, ESQ., F.R.H.S. | F. G. CLARKE, ESQ.
G. H. L. MACKENZIE, ESQ. | E. J. OAKLEY, ESQ.

F. H. ABBOTT, ESQ., *Secretary.*
S. PERCY LANCASTER, ESQ., F.R.H.S., *Asst. Secretary.*

The Minutes of the Meeting held on the 17th September, having already been circulated were taken as read and confirmed.

The Minutes of the Ordinary Council Meeting of the Agri.-Horticultural Society of India, held at the Society's Gardens, on Saturday, the 3rd of December, 1910, at 7-30 a.m.

Present.

THE HON'BLE SIR BIJOY CHAND MAHTAB, K.C.I.E., I.O.M., MAHARAJ ADHIRAJ OF BURDWAN, *President in the Chair.*

F. G. CLARKE, ESQ.
G. B. McNAIR, ESQ.
C. W. WALSH, ESQ.
HAROLD MARTIN, ESQ
J. DAVENPORT, ESQ.
SHIRLEY TREMEARNE, ESQ.
G. H. L. MACKENZIE, ESQ.
N. C. SEN, ESQ.
BABU AMBICA CHURN LAW.

F. H. ABBOTT, ESQ., *Secretary.*
S. PERCY LANCASTER, ESQ., F.R.H.S., *Asst. Secretary.*

The Minutes of the Meeting held on the 5th November, having already been circulated to the Council were taken as read and confirmed.

The following gentlemen were proposed and elected as Ordinary Member :--

H. A. Glucksman, Esq., Prince Victor Narayan of Cooch Behar.

CONTRIBUTIONS.

Federated Malay States Government Gazette, Vol. II, Nos. 30-48 from July 13th to December 5th, and Supplement to above Government Gazette, July 18th, 1910, 5 copies, and August 19th, 1910, 1 copy. From the Government of Malay.

Annual Administration Report of the Government Botanic Gardens and Parks, Nilgiris, for the year 1909-1910. 2 copies. From the Government of Madras.

Season and Crop Report of Bengal for the year 1909-1910. 1 copy. From the Government of Bengal.

Administration Report on the Jails of Bengal for the year 1909. 1 copy. From the Government of Bengal.

Annual Report on the Reformatory Schools at Hazaribagh for the year 1909. 1 copy. From the Government of Bengal.

Season and Crop Report of Burma for the year ending the 30th June 1910. 1 copy. From the Director.

Report on the Government Agri.-Horticultural Gardens, Lahore, for the year 1909-1910. 2 copies. From the Superintendent.

The Journal of the Royal Agricultural Society of England, Volume the Seventeenth. 1 copy. From the Society.

The Journal of the Royal Horticultural Society, Vol. XXXV, Part II for November 1909, 1 copy, and Vol. XXXV, Part I for July 1909, and Vol. XXXVI, Part I for July 1910, 3 copies in all. From the Society.

The Journal of the Bombay Branch of the Royal Asiatic Society, No. LXIV, Vol. XXIII, 1909. 1 copy. From the Society.

Bulletin de la Societe Imperiale Des Naturalists De Moscau, Annee, 1908, Nos. 1 and 2, 3 and 4. Nonvelle Seni, Tome XXIII, Annee 1909. From the Society.

Notes on the Soils of Bengal, by Mr. D. N. Mukerjee, M.A., M.C., A.C. 1 copy. From the Government of Bengal.

Report of the Secretary of Agriculture, Washington, 1909. 1 copy. From the Director.

Records of the Geological Survey of India, Vol. XXXVIII, Part IV, 1910, Vol. XXXIX, 1910 and Vol. XL, Part I, II, III. From the Government of India.

Bulletin of the Department of Agriculture Jamaica, Vol. I, Nos. 1, 2 and 3, New Series, 1909 and 1910. 3 copies. From the Director.

Agricultural News, a Fortnightly Review of the Imperial Department of Agriculture for the West Indies, Vol IX, Nos. 213, 214 and 215, from June 25th to July 23rd. Vol. IX, Nos. 212, 216, 217, 218, 220. for June 11th to October 1st, 1910. Vol. VIII, No. 192, dated 4th September 1909, and Vol. IX, Nos. 222 and 223 of 29th October and 12th November 1910. From the Director.

The Agricultural Ledger, 1908-1909, No. 7. 2 copies. From the Government of India.

Bulletin of Miscellaneous Information, Royal Botanic Gardens, Kew, Appendix III, 1910, and Nos. 3, 4, 5, 6. 5 copies. From the Director.

Second Report on the Introduction of Improvements into Indian Agricultural by the work of the Agricultural Department, 1910. 2 copies. From the Government of India.

The Transvaal Agricultural Journal, Vol. VII, No. 31, for. April 1910. 1 copy. From the Director.

The Philippine Agricultural Review, Vol. III, Nos. 2, 5, 6, 7, 8, 10 and 11. From the Director.

Annual Report of the Indian Musuem, Industrial Section for the year 1909-1910. 1 copy. From the Government of India.

Report on the Progress of Agriculture in India for 1907-1909. 1 copy. From the Government of India.

Memoirs of the Department of Agriculture in India, Life Histories of Indian Insects. Coleoptera, Vol. II, No. 8, June 1910. Vol. III, No. V, September 1910. From the Government of India.

Agricultural Bulletin of the Straits and Federated Malay States, Vol. IX, Nos. 8, 9, 10 and 11 for August, September, October and November 1910. From the Director.

The Indian Forester, Vol. XXXVI, Nos. 6 to 10 for June to October 1910. From the Director.

Bulletin of Miscellaneous Information Royal Botanic Gardens, Kew, No 8, 1910. 1 copy. From the Director.

Report of the Agricultural Department Eastern Bengal and Assam for the year ending 30th June 1910. From the Director.

Report on the Operations of the Department of Agriculture, Burma for the year ending the 30th June 1910. From the Director.

Report on the working of the Department of Agriculture of the Central Provinces for the year 1909-1910. From the Director.

Land Records Administration Report of Burma for the year ending 30th June 1910. From the Director.

Annual Report on the Botanic Gardens, Singapore and Penang for the year 1909. From the Director.

Season and Crop Report of the Central Provinces and Behar for the year 1909-1910, (Department of Land Records Central Provinces). From the Director.

Report of the Civil Veterinary Department, Eastern Bengal and Assam for the year 1909-1910. From the Director.

Annual Report of the Empress and the Buna Gardens Poona for the year 1909-1910. From the Director.

Report on the Administration of the Police of the Lower Provinces, Bengal Presidency for the year 1909. From the Government of Bengal.

The Trade of Bengal with Nepal, Tibet, Sikkim and Bhutan for the official year ending 31st March 1910. From the Government of Bengal.

Report of the Agricultural Department Bengal for the year ending 30th June 1910. From the Government of Bengal.

The Agricultural Journal of India, Vol. V, Part IV, October 1910. From the Director Agricultural Research Institute, Pussa.

PRESENTATIONS.

FROM H. E. HOUGHTON, ESQ., A. & H. GARDENS, MADRAS—

1 Acrosticum aureum.
1 Adiantum C. V. var. Mariesii.
1 „ Lawsonii.
1 „ tinctum.
1 „ undulatum
1 Davallia fijiensis plumosa
1 Selaginella gracilis
1 Spineless lime.
2 Fruiting Cactus (Burbank's hybrids.
1 Furcrea Watsoniana.
1 Agave Woodrowi.
1 Ligustrum japonicum variegatum.
2 Araucaria excelsa. (?)
1 *packet* seed Entada scandens.
5 seeds Hyphæne Thebaica.

FROM THE SUPERINTENDENT, VICTORIA GARDENS, BOMBAY —

1 Tamarix dioica.
1 Angelonia alba.
1 Solandra gr. fl. magnifica.
1 Aralia papyrifera.
1 Salvia Pitcheri.
1 Acalypha integrifolia bicolor.
1 „ colorata.
1 Goldfussia isophylla.
1 Gerbera Jamesonii.
1 Sambucus variegatus.
1 Cyrtodeira species.
1 Clidenia vittata.

FROM MRS. SETH APCAR, QUEENS PARK, BALLYGUNGE—

1 Operculina.
1 Calanthe.
1 Duranta variegata.
1 Hæmanthus sp.
1 Rudbeckia "Golden Glow."
1 Dædalacanthus deep blue.
6 Asystasia.
1 Ornamental grass.
1 *packet* seed Clematis white.

FROM SRIJUT RASH BEHARY ROY, SERAMPORE —

4 Magnolia grandiflora.
1 Ixora pink.
1 Chonemorpha Griffithsii.

FROM A. COOKE, ESQ., RANCHI—

1 *packet* Abutilon sp.
1 *packet* Java-Natal Indigo.

FROM THE CURATOR, GOVT. BOTANIC GARDENS, LAHORE—

1 *packet* Pinus longifolia.
1 *packet* Dodonæa viscosa.

FROM THE CURATOR, NATAL BOTANIC GARDENS—

1 *packet* seed Jacaranda mimosæfolia.

FROM MR. HARA SANKAR ROY—

3 *plants.*

FROM THE SUPERINTENDENT, VICTORIA GARDENS, BOMBAY—

76 *plants.*

FROM MRS. SIMPSON, KIDDERPORE—

6 *plants.*

FROM MR. A. C. LAW—

6 *plants.*

SHORT NOTES AND DESCRIPTIONS OF PLANTS IN THE SOCIETY'S PRICE LISTS.

(Continued from Proceedings and Journal for January - June, 1910.)

ADDITIONAL NOTES FROM MEMBERS IN VARIOUS DISTRICTS WILL BE GLADLY ACCEPTED.

PACHIRA (Malvaceæ) *cyathiphora*. A medium sized tree of handsome appearance and bearing in December large white flowers in which the long white filaments play a prominent part. Propagated by seeds.

PANAX (Araliaceæ). Handsome shrubs, useful for hedges while the finely divided foliage of some varieties are used for decoration purposes. Propagated by cuttings.

PANCRATIUM (Amaryllideæ). A genus of bulbous plants usually with white bell shaped flowers sweetly scented, somewhat like the Crinum in general appearance, requires little looking after. Propagated by off-sets.

PANDANUS (Pandaneæ). *The Screw pine. Keora or Keya.* A large genus of shrubs or trees of handsome appearance; the long sedge like leaves growing in a screw like arrangement. The plant extends itself by its aerial roots and grows into a huge jungle. In the young state several varieties are used for table decoration.

odoratissima, (Keora) furnishes the scent so largely used among the natives of India; it blossoms in the rains. The leaves of the Pandanus are composed of tough white glossy fibres and used for matting, cordage etc. Propagated by division and seeds.

PANICUM (Gramineæ) *variegatum*. A pretty dwarf growing grass of prostrate habit variegated with crimson and

white. Largely used in hanging baskets and rockeries. Propagated by root cuttings.

PAPYRUS (Cyperaceæ) *antiquorum. The Egyptian Paper Reed or Rush.* A tall handsome rush, bearing an umbel of thread like leaves at the top of a triangular stem. The pith of the reed beaten out and pressed constituted the *papyrus* of antiquity. Propagated by division.

PARDANTHUS (Irideæ) *chinensis. The Leopard flower.* A tall iris like plant with orange flowers spotted with purple brown. Propagated by division of off-sets or seeds.

PARSONSIA (Apocynaceæ) *corymbosa.* A scandent shrub or creeper bearing masses of small crimson flowers in great profusion, the foliage is small and very dark green. Propagated by layers.

PASSIFLORA (Passifloreæ). *The Passsion-flower* is named in allusion to a fancied representation in the blossoms of the instruments of the *Crucifixion.* A large genus of climbing plants which produce for the most part very varied and beautiful flowers. The plants grow in almost any soil and the fruit, which some varieties produce, is known as the granadilla and pronounced a delicacy. Propagated by layers cuttings or seeds.

PAVETTA (Rubiaceæ) *madagascariensis.* A dwarf Ixora-like shrub producing small fragrant white flowers. Propagated by cuttings.

PEDILANTHUS (Euphorbiaceæ) *Jew's bush.* A curious ornamental plant, hardly worth notice except for the variegated foliage of some varieties and the peculiar mishapen scarlet shoe-like flowers. Propagated by cuttings.

PELIOSANTHES (Haemodoraceæ). Dwarf plants like the Curculigo in foliage producing spikes of curious green or

violet flowers succeeded by blue or purple berries. Propagated by seed or division.

PELLONIA (Urticaceæ). A genus of creeping perennial herbs with handsome variegated foliage, largely used in rockeries and hanging baskets. Propagated by cuttings.

PENTAS (Rubiaceæ) *carnea.* A dwarf shrub bearing pale lavender or flesh coloured flowers resembling the Ixora. Propagated by layers.

PEPEROMIA (Piperaceæ) *Pepper Elder.* Ornamental little plants used for rockeries and hanging baskets. The leaves are usually heart shaped and grow close together. Propagated by leaf cuttings.

PERESKIA (Cacteæ) *Barbadoes Gooseberry. Aculeata* has single white rose-like flowers while *Bleo* has double red flowers. Both the varieties are very untidy growers, the cyclindrical stems being armed with sharp spines, the fruit is eaten and said to resemble the gooseberry in flavour. Propagated by cuttings.

PERGULARIA (Asclepiadeæ) *odoratissima. Kunja lata. Primrose or Cowslip creeper.* A quick growing creeper bearing drooping masses of small greenish yellow flowers scented like the cowslip. Propagated by seed or layer.

PERIPLOCA (Asclepiadeæ) *esculenta.* A handsome creeping plant with small white flowers. The fibre of this plant is used for ropes etc. and the flower buds are eaten as a vegetable. Propagated by layers.

PERISTROPHE (Acanthaceæ) *angustifolia aurea-variegata. Veta-rang.* A dwarf creeping plant with small majenta flowers and handsome foliage which during the cold weather is variegated with golden yellow. Propagated by cuttings.

PETRÆA (Verbenaceæ) *volobulis.* A heavy growing creeping shrub producing long racemes of bright blue-purple star-shaped flowers which unfortunately do not last any time. It forms a handsome addition to a garden. Propagated by cuttings.

PHÆDRANASSA (Amaryllideæ) *gloriosa.* A dwarf bulbous plant which bears a remarkable flower partly green and partly vermillion. Propagated by off-sets.

PHALANGUIM (Liliaceæ) *argentium* vide *Anthericum variegatum.*

PHALERIA (Thymelaceæ) *laurifolia.* A dwarf shrub with white flowers which have a delicious *Daphne*-like scent. Propagated by layer.

PHILODENDRON (Aroideæ). A large genus of epiphytes with very ornamental leaves; they do excellently for covering an old tree or pillar. Propagated by cuttings.

PHLOGOCANTHUS (Acanthaceæ) *thyrsiflorus.* A dwarf shrub with small spikes of tawny or dull flame coloured flowers. Propagated by cuttings.

PHRYNIUM (Scitamineæ) *variegatum* syn: *Maranta arundinacea variegata.*

PHYLLANTHUS (Euphorbiaceæ). The variety *atro-purpureus* forms a very handsome shrub, the new green foliage of which turns to deep chocolate in a few days while *nervosus* has the new leaves marbled with cream and white. Propagated by layer.

PHYLLARTHRON (Bignoniaceæ). A tall shrub or tree with handsome foliage and pretty little Bignonia-like flowers, pink in colour. Propagated by layer.

PHYLLOCACTUS (Cacteæ). A beautiful genus of night flowering cactus in which a remarkable variety of shades is obtainable from white through shades of scarlet to a mauve. Unfortunately these do not survive very long on the plains. Propagated by cuttings.

PHYLLOTENIUM (Aroideæ) *Lindeni* (syn: *Xanthosma Lindeni*). A magnificient ornamental plant of the Alocasia species with bright green leaves veined with ivory white. Propagated by division and cutting.

PHYTOLACCA (Phytolacceæ) *decandra. Pigeon berry. Virginian Poke weed. Red ink plant.* A dwarf ornamental shrub the leaves have rather an unpleasant odour, producing long bunches of small white flowers succeeded by dark purple berries. Propagated by cuttings.

PILEA (Urticaceæ) *muscosa* (syn: *microphylla*). A low growing creeping herb with small green ornamental foliage, very useful in rockeries and baskets. Propagated by cuttings.

PINUS (Coniferæ) *longifolia. Chir. The Kumaon Pine.* A handsome Pine tree occasionally met with on the plains but very common on the hills between 1,500 and 7,000 feet. Oleo-resin and tar are extracted from this plant and the wood is used for tea boxes etc. Propagated by seeds.

PIPER (Pipereæ) *Betul.* This creeper yields the betel leaf so commonly used by the Asiatics. It is grown under shade and requires a great deal of care and attention as it is very susceptible to differences of atmosphere. The bleached leaves are prepared as *pán.*

ornatum is a handsome creeper with the heart shaped leaves heavily dotted with pink.

magnificum is a dwarf shrub with pretty deep bronzy green foliage. Propagated by layer and cutting.

PITCAIRNIA (Bromeliaceæ). Pine-apple like plants with long sedge like leaves, producing a dense raceme of bright red or scarlet flowers. These plants are largely used in rockeries. Propagated by division.

PITHECOLOBIUM (Leguminoseæ) *Samon*, (syn. *Inga Samon*). *The Rain Tree.* A very large spreading tree of rapid growth used for avenues and shading tea etc. The wood is only good for fuel. Propagated by seeds.

PLECTRANTHUS (Labiateæ) *aromaticus. The Bread and Butter plant.* A dwarf herbaceous shrub with solid succulent leaves which have a pleasant aromatic taste. Propagated by cuttings.

PLUMBAGO (Plumbagineæ). A genus of handsome flowering shrubs of which *capensis* with its pale lavender blue flowers is the best. *Rosea* has long racemes of bright red flowers but is rather untidy growth and *zeylanica* with its white blossoms forms a large bush. The plants are of medicinal value. They require a more or less shady situation and are propagated by layers or cuttings.

PLUMERIA (Apocynaceæ) *Frangipani. Spanish Jessamine.* There are several varieties of this tall shrub or tree with flowers varying from yellow and white through intermediate shades to crimson. The flowers are borne in large bunches and are usually sweet scented, the plant presenting a very pretty sight when in full flower. Unfortunately the plant looses its leaves in the cold weather which detracts from its appearance. Propagated by seeds or cuttings.

PODOCARPUS (Conifereæ). A genus of pine trees forming very handsome

wood is used for oars masts and planking. Propagated by seeds and layers.

POGOSTEMON (Labiateæ) *Pachpatta. Patchouli.* A dwarf succulent shrub yielding the famous perfume used by the natives of India *(plectranthoides syn. Plectranthus aromaticus.)* Propagated by cuttings.

POINCIANA (Leguminoseæ) *bicolor, concolor* and *pulcherrima* belong to the dwarf section of this genus. The plants never grow taller than 15 feet and produce long terminal racemes of crimson and yellow, orange and red or golden yellow flowers.

regia. Flamboyant or, the Flame of the Forest, Royal Peacock flower, is a large spreading tree commonly seen in Bengal. It comes into bloom at the commencement of the hot weather and forms a conspicuous sight with its masses of scarlet or orange flowers. It is of very rapid growth but the wood is very brittle and destroyed by high winds. Propagated by seeds.

POINSETTIA (Euphorbiaceæ). These well-known shrubs supply the gorgeous scarlet or cream bractial leaves which enter so largely into Xmas decorations. They are of easy culture but require the full sunshine to develop the plants. Propagated by cuttings.

POIVREA (Combretaceæ). Very beautiful flowering creepers of sturdy growth, bearing large bunches or brushes of scarlet or crimson flowers. The plants flower very profusely. Propagated by layer.

POLIANTHES (Amaryllideæ) *Gul-subhu. Rajani ganda. The Tuberose.* This indespensible bulbous plant needs little description. After being well established it throws up a spike of white Stephanotis like flowers which have an overpower-

ing scent. There is a double variety known as *The Pearl* but this does not flower so freely. Propagated by division of offsets.

POLYALTHIA (Anonaceæ) vide *Guatteria.*

POLYSCIAS (Araliaceæ) *paniculata* vide *Terminalia elegans.*

PORANA (Convolvulaceæ) *paniculata. Bridal Bouquet.* A very rampant creeper which is covered in November and December with small dazzling white closely massed flowers having an agreeable perfume. Propagated by layer and suckers.

POTHOS (Aroideæ). Epiphytic creepers of handsome appearance with leaves variegated with yellow or cream. Propagated by cuttings.

PROSOPIS (Leguminoseæ) *juliflora. The Indian Locust Tree. Sada sami.* A tall tree, the leaves and beans of which are used during famine as fodder. The plant is also of slight medicinal value. Propagated by seeds.

PSIDIUM (Myrtaceæ). The Guava family. *Cattleyanum* is the famous strawberry Guava and bears fruit the size of a large marble containing delicious red pulp which is exquisitely scented and very sweet.

guava folliis variegata forms a large tree and has its foliage marbled with white. Propagated by seeds and layers.

PSYCHOTRIA (Rubiaceæ) *undata.* A dwarf flowering shrub of medicinal properties, bearing small white flowers. It is said to be used as a substitute for ipecacuanha. Propagated by seeds.

PTEROCARPUS (Leguminoseæ). Tall timber trees,—*indicus* being the Padouk or Burmese Rosewood which produces

a gum almost identical with kino, and the valuable wood enters largely into furniture making, etc.

marsupium is known as the Indian Kino tree and is occasionally grown for its gum while the wood is used for sleepers, furniture, etc. Propagated by seeds.

PTEROSPERMUM (Sterculiaceæ) *Konak Champa. acerifolia* is a tall tree having its large leaves backed with dead white and with creamy sweet scented flowers. The flowers are soaked and the gelatinous liquid resulting, is drunk by the natives as a medicine.

lancifolius (*longifolia*) is a dwarf tree with white flowers and narrow lance shaped foliage. Propagated by seeds.

PUNICA (Lythrarieæ). *The Pomegranate. Anar.*

granatum flore-pleno is a double flowered variety with vermillion blossoms but the fruit is not worth eating. Propagated by layer.

PUTRANJIVA (Myricaceæ) *Roxburghii. Jalpiti.* A very handsome foliage tree somewhat like the Debdar but with pendant branches. Propagated by seeds.

PUTTIA (Apocynaceæ) *grandiflora.* A tall shrub with large white Plumeria-like flowers. Propagated by cuttings.

INTERESTING REFERENCES.

Soya flour for human consumption.

It is not perhaps generally known that during the past year or so, an enormous industry has sprung up in the United Kingdom, and the U. S. A. owing to the opening up of Manchuria and the discovery of the wonderful properties of the Soya bean.

The Soya bean has been used as human food in Manchuria, China and Japan for centuries, and there is now manufactured a Soya flour for human consumption from the Soya bean after the oil has been extracted.

By this process which includes thorough cooking by raw steam the flour is made in a perfectly digestible and palatable form.

It is very rich in feeding properties as is shown by the following approximate analysis :—

Albuminoids (flesh formers) ...	45·25%
Carbohydrates (fat and heat formers) ...	29·89%
Oil	2·50%

wheaten flour contains about 11% albuminoids.

Soya flour is therefore about four times as nutritious as wheaten flour.

Soya flour is pre-eminently the food for tropical climates, where albuminoids cannot be taken in the form of flesh.

The human system must have albuminoid (proteid) to build up flesh and to restore waste tissues.

A tropical climate causes more than ordinary waste of tissues and this waste can only with comfort be restored

by a vegetable source of albuminoids, flesh being too heating.

Soya flour is also used for making biscuits and one of the well-known English Biscuits manufacturers are now making several varieties of Soya biscuits.

It should be noted however that as Soya flour is so rich in feeding properties it *must not be used alone* but must be mixed with lighter or more starchy foods.

Proper proportions are—

For Bread, one part of Soya flour to four parts ordinary wheaten flour.

For Biscuits, one part Soya flour to about three parts ordinary flour.

This addition practically doubles the nutritive properties of the food at the same time is lowering the price.

Soya Meal for Cattle feeding.

A very common complaint amongst stock breeders and more especially horse breeders—is that present day foods do not build up sufficient bone in young stock.

The Soya meal contains about 3% *of phosphates* or *bone formers*, it is therefore, eminently suitable for the feeding of young stock and it is readily, even greedily eaten by horses and all classes of stock.

The Soya meal is especially valuable for Dairy feeding as the albuminoids which are so high are the milk formers.

Applications should be addressed to the undersigned.

F. H. ABBOTT,

Secretary.

The Soya Bean.

This bean grows well on light soils in Bengal and can be sown as a mixed crop with juar or maize in July. It requires neither manuring nor special cultivation. If sown in July it should be ready for harvesting in November or December. About 20 seers of seeds are required to sow an acre of land and the average outturn is approximately 6 maunds to the acre. This is the result of small experiments only and could probably be considerably improved in suitable localities and with special cultivation. Experiment alone however can actually determine this latter point.

The Soya bean is not only extraordinarily rich in nitrogenous compounds but is also rich in oil. It grows well at elevations of from 3,000 to 5,000 feet, where the cultivation is practically the same as for Dal.

The Soya Bean Trade.

The last issue of the Bulletin of the Imperial Institute has an article on the cultivation and utilization of the Soya bean. A good many of the facts given in the article have already appeared in the Indian Trade Journal, but the following passages may be read with advantage:—The first large cargo of Soya beans consigned to the United Kingdom arrived in Hull on the 2nd of March, 1909, and amounted to 5,200 tons. It is stated that before June contracts had been made for the delivery of no less than 200,000 tons. The beans are said to arrive at their destination in perfect condition in spite of the great distance they have to be carried. They are classified into three grades: No. 1, shipped at Dalny; No. 2, shipped at Vladivostok; and No. 3, shipped at Hankow. The value of grade No. 1 is about £6-8s. per

ton gross, c. o. f. European port direct, whilst the values of Nos. 2 and 3 are equal and about £6 6s. per ton gross, these prices being, of course, subject to the fluctuations of the market. The greater part, if not the whole, of the Soya beans imported into this country is purchased by the proprietors of oil-mills, who crush the product and thus obtain a quantity of oil, amounting to about 10 per cent. by weight of the seed, and a residual oil-cake which has proved to be a valuable cattle-food.

Cultivation.

The Soya bean grows most satisfactorily on soils of medium texture containing fair quantities of potash, lime and phosphoric acid. It is said that good results have been obtained on comparatively light soils and that an abundant crop is sometimes produced on land too poor for clover. In South Carolina, good results have been obtained on sandy limestone or marshy soils and also on drained swamp and peaty lands. If the soil is lacking in potash or phosphoric acid these constituents should be supplied in the form of artificial manure. It is not necessary to apply nitrogenous manures, since the Soya bean, like other, leguminous crops, has the property of restructing nitrogen from the air and thus enriching the soil in which it is grown.

With regard to climate, the Soya bean requires about the same temperature as maize. The plant is very resistant in drought, can endure slight frosts, and is capable of withstanding excess of moisture in this last respect, it is said to surpass cowpeas or even maize.

The cultivation of the Soya bean is carried out in much the same way as that of ordinary field beans. The soil

should well tired and left smooth and free from clods. The seed is best sown in drills from two to three feet apart, the exact distance depending on the texture of the soil. The amount of seed required is about one-half to three-quarters of a bushel per acre, enough being sown to give on the average five or six plants per foot in the row. After sowing, the land must be kept fairly free from weeds and the surface soil must be occasionally broken up. The pods are usually harvested before they are quite ripe, as otherwise they are liable to burst on drying, a loss of seed being thus occasioned. The plants may be pulled by hand or cut with a scythe; they are collected into small heaps in order to facilitate drying. When dry, the seed can be readily separated by an ordinary threshing machine.

Under ordinary circumstances, an yield of 25 to 40 bushels per acre is obtained, under specially favourable circumstances the crop may be considerably larger.

Glycine Soia is not only of value to cultivators for the sake of its seeds, but it can also be grown for green forage, for ensilage, for hay or as a pasture plant. Reference has already been made to the special value the plant possesses due to its ability to restore impoverished soil by affording it a supply of nitrogen. Compare also this Bulletin, 1906, 4, 123. An account of the utilisation of the Soya bean plant for these various purposes is given in "The Soya Bean as a Forage Crop," Farmer's Bulletin, No. 58, United States Department of Agriculture (1899). It has been found that the earlier varieties are best for seed crops and the later varieties for hay, forage and ensilage.

Utilisation of the Seeds.

The oil possesses an agreeable taste and odour and is largely used by the Chinese for edible purposes. It belongs to the

class of semi-drying oils, that is to say, it has properties intermediate between those of the drying oils such as linseed oil, and the non-drying oils, such as almond and olive oils. On exposure to the air, a thin skin is gradually formed on the surface. It resembles cotton seed oil in many respects, but is of a more pronounced drying character, as is indicated by its higher iodine value. The oil consists mainly of the glycerides of salmitic, oleic and linolic acids. The physical and chemical constants, which have been recorded for Soya bean oil are given below, the corresponding figures for cotton-seed oil being added for comparison:—

	Soya bean oil.	Cotton-seed oil.
Specific gravity at 15° c.	0·9240— 0·9270	0·9220— 0·9260
Saponification value ...	190·6 192·9	191·0 —196·5
Iodine value... ...	121·3 —124·0	101· —116·
Hehner value ...	95·5	95·9 — 96·2

The oil is chiefly used in this country for the manufacture of soap and is very well suited for this purpose. It is quoted in the London market at £21-5s. per ton (September 1909), with crude cotton-seed oil at £23-5s. per ton.

The oil cake left after the expression of the oil is hard and heavy, and resembles linseed cake, but is lighter in colour and has a characteristic taste recalling that of peas. The nutritive value of this product is approximately equal to that of decorticated cotton-seed cake. The average composition is as follows:—Albuminoids 41 per cent., oil 3 per cent., ambohydrates 30 per cent., moisture 12 per cent., fibre 5 per cent., mineral constituents 6 per cent.

Feeding trials with this cake in comparison with decorticated cotton cake have been carried out at the Cumberland and Westmoreland Farm School at Newton Rigg and

also at the Royal Agricultural College, Cirencester. At the former institution it was found that the cows, when fed with Soya bean cake, gave rather more milk than when fed with cotton cake; but the difference was so small that it may be considered that the two cakes are equal in this respect. The proportion of fat in the milk was the same in each case. During the trial the cows gained in weight, the Soya bean cake causing a slightly larger increase than the cotton cake. The Soya bean cake used in these experiments contained 6·0 per cent. of oil and 44·4 per cent. of albuminoids, whilst the cotton cake contained 13·1 per cent. of oil and 39·9 per cent. albuminoids.

The experiment at Cirencester showed that the yield of milk was but little affected by the kind of cake used. The percentage of fat in the milk was slightly higher with the Soya bean cake than with the cotton cake. The butter produced from the milk of the cows fed with Soya bean cake was quickly obtained on churning, but was softer and of a paler colour and somewhat inferior flavour to that from the milk produced by the cows fed with the cotton cake. The Soya bean cake and in these trial contained 6 per cent. of oil, and 40 per cent. of albuminoids, and cost £6-10s. per ton, which the decorticated cotton cake contained 8 per cent. of oil and 34 per cent. of albuminoids, and cost £7-10s. per ton.

In the experiments at Cirencester no difference was observed in the effect of the two cakes on the cows with regard to their laxative or constipative action. It may be mentioned, however, that certain cases have recently been brought to the notice of the Imperial Institute in which it was stated that the Soya bean cake when fed to cows produced a scouring or laxative effect. It seems not unlikely, however, that these symptoms may have been caused by

the use of an ill-proportioned diet. Owing to its excessive richness in albuminoids, Soya bean cake should be used with the same precautions as are observed in the case of decorticated cotton cake, which is said to be unsuited to calves and lambs, and when used for adult, stock should be mixed with about an equal weight of some cereal product, such as maize, barley meal, wheat meal, or American flour.

PROCEEDINGS & JOURNAL

OF THE

Agricultural and Horticultural Society of India.

For January–June, 1911.

FOUNDED 1820.

"A body of men engaged in the same pursuits form a joint stock of their information and experience, and thereby put every individual in possession of the sum total acquired by them all."—*Carey.*

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Council.

JOHN DAVENPORT, ESQ.
F. G. CLARKE, ESQ.
E. J. OAKLEY, ESQ.
G. H. L. MACKENZIE, ESQ.
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RAJA PEARY MOHAN MOOKERJEE, C.S.I.
HAROLD MARTIN, ESQ.
H. H. THE MAHARAJA OF DURBHANGA.

* * *

The Minutes of the Ordinary Monthly Meeting of the Council of the Agri.-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 17th January, 1911, at 8 a.m.

Present.

THE MAHARAJ ADHIRAJ SIR BIJOY CHAND MAHTAB BAHADUR OF BURDWAN, K.C.I.E., I.O.M., *President in the Chair.*

GEO. GIRARD, ESQ., F.R.H.S.
E. J. OAKLEY, ESQ.
BABOO AMBICA CHURN LAW.
C. W. WALSH, ESQ.
F. H. EGGAR, ESQ.
J. DAVENPORT, ESQ.
G. H. L. MACKENZIE, ESQ.
N. C. SEN, ESQ.

F. H. ABBOTT, ESQ., *Secretary.*
S. PERCY LANCASTER, ESQ., F.R.H.S., *Asst. Secretary.*

The Minutes of the Meeting held on the 4th December 1911 that had already been circulated were confirmed.

* * *

The Minutes of the Ordinary Meeting of the Council of the Agri-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 11th February, 1911, at 7-30 a.m.

Present.

THE MAHARAJ ADHIRAJ SIR BIJOY CHAND MAHTAB BAHADUR OF BURDWAN, K.C.I.E., I.O.M., *President in the Chair.*

G. B. McNAIR, ESQ.
SHIRLEY TREMEARNE, ESQ.
J. DAVENPORT, ESQ.
C. W. WALSH, ESQ.
GEO. GIRARD, ESQ., F.R.H.S.
G. H. L. MACKENZIE, ESQ.
F. H. EGGAR, ESQ.
N. C. SEN, ESQ.

F. H. ABBOTT, ESQ., *Secretary.*

S. PERCY-LANCASTER, ESQ., F.R.H.S., *Asst. Secretary.*

The Minutes of the Annual General Meeting held on the 7th January 1911 also of the Council Meeting of same date which had already been circulated were confirmed.

* * *

The Minutes of the Ordinary Monthly Meeting of the Council of the Agri.-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 4th March, 1911 at 7-30 a.m.

Present.

THE MAHARAJ ADHIRAJ SIR BIJOY CHAND MAHTAB BAHADUR OF BURDWAN, K.C.I.E., I.O.M., *President in the Chair.*

SHIRLEY TREMEARNE, ESQ.
G. H. L. MACKENZIE, ESQ.
GEO. GIRARD, ESQ. F.R.H.S.
G. B. McNAIR, ESQ.
N. C SEN, ESQ.
MAJOR GAGE, I.M S.
JOHN DAVENPORT, ESQ.
HAROLD MARTIN, ESQ.
F. G. CLARKE, ESQ.
BABOO AMBICA CHURN LAW.

F. H. ABBOTT, ESQ., *Secretary.*

S. PERCY-LANCASTER, ESQ., F.R.H.S., *Asst. Secretary.*

The Minutes of the Ordinary Meeting held on the 11th February 1911 having been already circulated were confirmed.

* * *

The Minutes of a Special Meeting of the Council of the Agri.-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 29th April, 1911, at 7-30 a.m.

Present.

JOHN DAVENPORT ESQ., *in the Chair.*

G. H. L. MACKENZIE, ESQ.	C. W. WALSH, ESQ.
G. B. McNAIR, ESQ.	N. C. SEN, ESQ.
BABOO AMBICA CHURN LAW.	

F. H. ABBOTT, ESQ., *Secretary.*

S. PERCY-LANCASTER, ESQ., F.R.H.S., *Asst. Secretary.*

* * *

The Minutes of the Ordinary Meeting of the Council of the Agri.-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 10th June, 1911, at 7-30 a.m.

Present.

C. W. WALSH, ESQ., *Vice-President in the Chair.*

F. H. EGGAR, ESQ.	G. B. McNAIR, ESQ.
JOHN DAVENPORT, ESQ.	E. J. OAKLEY, ESQ.
JOHN SIMPSON, ESQ.	N. C. SEN, ESQ.

F. H. ABBOTT, ESQ., *Secretary.*

S. PERCY-LANCASTER, ESQ., F.R.H.S., *Asst. Secretary.*

The Minutes of the Ordinary Meetings held on the 4th March and 29th April, 1911, respectively that had already been circulated were confirmed.

The following gentlemen were proposed and elected as Ordinary Members :—

The Manager, 11 Annas Mechpara Zamindary Estate.

R. N. Mookerji, Esq., C.I.E., Mrs. D. M. Smith, Raj Kumar Janaknandan Singha, A. W. Kingham, Esq., Gopal Bullub Dass, Captain R. Anderson.

Rejoined—The Manager, Addabari Tea Estate, The Manager, Atal Tea Estate, The Manager, Kuthal Tea Estate, The Manager, New Glencoe Tea Estate, The Manager, Mohima Tea Estate, K. Shelly Bonnerjee, Esq.

CONTRIBUTIONS.

Federated Malay States Government Gazette, Vol. II, Nos. 49 to 53 from 9th to 30th December, 1910 and Vol. III, Nos. 1 to 21 from January 6th to May 17, 1911. Index to this paper for the year 1910. From the Government of Malay.

Bulletin No. 36 of the Department of Agriculture, Bombay. First experiments in the treatments of Grape Vine mildew in the Bombay Presidency by Mr. William Burns, Economic Botanist, 1 copy. From Government of Bombay.

Bulletin No. 37 of the Department of Agriculture, Bombay. An examination of the seed supply of the Broach District. 1 copy. From Government of Bombay.

Bulletin No. 38 of the Department of Agriculture Bombay.

Experiments with the water Finder of Messrs. Mansfield & Coy. 1 copy. From the Government of Bombay.

Bulletin No. 39 of the Department of Agriculture, Bombay.

The Salt Lands of the Nira Valley. 1 copy. From the Government of Bombay.

Annual Report of the Kalimpong Demonstration Farm for the year 1909-1910. 1 copy. From the Government of Bengal.

Annual Report of Agricultural stations in charge of the Deputy Director of Agriculture, Bengal, for the year 1909-1910. 1 copy. From the Government of Bengal.

Report on the trade carried by Rail and River in Bengal in the official year 1909-10. 1 copy. From Government of Bengal.

Season and Crop report of the Bombay Presidency, for the year 1909-1910. 1 copy. From the Director.

Report on the Government Botanical Gardens, Saharanpore, for the year ending 31st March 1910. 1 copy. From the Editor.

Report on the Agricultural stations in the Central Provinces and Berar, for the year 1909-1910. From the Editor.

Report on the Land Revenue Administration of Burma during the year ended the 30th June 1910. From the Editor.

Report on the Government Horticultural Gardens, Lucknow, for the year ending 31st March 1910. From the Director.

Report on the operations of the Department of Agriculture, Madras Presidency, for the official year, 1909-1910. From the Director.

Annual Report of the Royal Botanic Gardens and other Gardens in Calcutta and of the Lloyd Botanic Gardens, Darjeeling, for the year 1909-1910. From the Superintendent.

The Agricultural News Vol. IX, Nos. 224 to 226 from November 26th to December 24th, 1910 and Vol. X Nos. 227, 228 from January 7th to January 21st, 1911. From the Director.

Bulletin of Miscellaneous Information of the Royal Botanic Gardens, Kew, No. 9 and 10 of 1910 and Appendix II, 1910, 3 copies in all and No. 1 to 3 of 1911 and Appendix II and III of 1911. From the Director.

Agricultural Bulletin of the Straits and Federated Malay States, Vol. IX, No. 12 and Vol. X, No. 2 of 1910 and 1911. 2 copies. From the Director.

The Philippine Agricultural Review, Vol. III, No. 9 and 12, for September and December 1910. From the Director.

The Agricultural Ledger No. 7 of 1908-1909. 2 copies. From Government of India.

The Agricultural News, Vol. X, Nos. 229, 231 to 233 from February 4th to April 1st, 1911. 4 copies. From the Director.

The Indian Forester Vol. XXXVI, November and December 1910 No. 11 and 12, 1 copy and Vol. XXXVII January and February 1911 No. 1 and 2. 1 copy. From the Editor.

Annual Report on the Botanic Gardens, Singapore, for the year 1910. 1 copy. From the Director.

Annual Report of the Department of Agriculture, Bombay Presidency, for the year 1909-1910. From the Director.

Report on the Administration of Bengal during 1909-1910. From Government of Bengal.

Report on the Maritime Trade of Bengal, for the official year 1910-1911. From Government of Bengal.

SHORT NOTES AND DESCRIPTIONS OF PLANTS IN THE SOCIETY'S PRICE LISTS.

(Continued from Proceedings and Journal for July—December, 1910.)

ADDITIONAL NOTES FROM MEMBERS IN VARIOUS DISTRICTS WILL BE GLADLY ACCEPTED.

QUASSIA (Simarubeæ) Bitter Quassia. *amara.* A tall shrub producing handsome scarlet flowers in abundance, "like red chillies." The bark is of medicinal value. Propagated by seeds and layers.

QUISQUALIS (Combretaceæ) Rangoon creeper. *indica.* A very rampant flowering creeper seen in nearly every garden in India. The drooping bunches of pink and white scented flowers are produced all the year round. Propagated by suckers.

RANDIA (Rubiaceæ) *maculata.* A very handsome tall shrub ; the flowers are trumpet shaped, white with dots and splashes of violet. Extremely difficult to propagate.

RAUWOLFIA (Apocynaceæ) Milk Wort. Moonga. *canescens.* A dwarf shrub with small white jasmine-like flowers succeeded by black seed which make a very pretty show on their scarlet peduncles. A common roadside jungle. Propagated by seed.

RAVENALA (Scitamineæ) (*Uraina speciosa*). *madagascariensis.* This tall plantain-like plant is known as the Travellers tree from the fact that a good supply of pure water can be obtained from the base of the leaf sheath by piercing it with a knife. Propagated by seed and division.

Ravenia (Rutaceæ) *humilis*. A tall evergreen shrub with dark foliage and deep rosy red flowers. Propagated by layers.

Rhyncospermum (Apocynaceæ) *jasminoides* (*Trachlospermum jasminoides*.) The Chinese Jasmine. A very pretty creeper with sweet scented jasmine-like flowers produced in great abundance. Propagated by layers.

Richardia (Aroideæ) *æthiopica*. The African Lily of the Nile. Arum. This well known Arum with a white spathe, grows to perfection in Ceylon and in the hills and though it produces a few flowers the first season in Calcutta, the plants do not thrive well. Propagated by division.

Rondeletia (Rubiaceæ) *speciosa*. A handsome flowering shrub somewhat like the Ixora in general appearance with orange red flowers. Propagated by layers.

Roupellia (Apocynaceæ) *grata*. The Cream Fruit creeper. A heavy growing shrubby creeper producing an abundance of dirty purplish-white flowers in the cold season. Propagated by layers.

Ruellia (Acanthaceæ). The two best known varieties are *rosea* and *ciliatiflora*. The former with pink and the later with purplish blue flowers. Both are more or less weeds and propagate themselves quickly by seeds.

Russelia (Scrophularineæ). Dwarf shrubs producing small scarlet tubular flowers in great profusion. *Juncea* has curious feathery foliage and is often used for hanging baskets etc. Propagated by cuttings.

Saintpaulia (Gesnereaceæ) *ionantha*. Natal Violet. A very pretty violet-like flowering plant. Succeeds in light sandy soil in a fern house and is nearly always covered with purplish blue flowers. Propagated by leaf cutting and seeds.

SALIX (Salicineæ) *babylonica*. The Weeping Willow. This well-known plant is chiefly grown by the side of a tank or drain and is a very handsome foliage tree. Propagated by cutting.

SALVIA (Labiateæ) *coccinea*. The Scarlet Sage. A very beautiful perennial plant which is chiefly grown as an annual with scarlet flowers borne on long sprays in great profusion. Propagated by seed and cutting.

SANCHEZIA (Acanthaceæ) *nobilis*. A handsome foliage plant with green leaves variegated with yellow. Propagated by cuttings.

SANSEVIERIA (Hæmodoraceæ). Bow-string Hemp. The several varieties of this genus are chiefly grown for the fibre which is extracted from the leaves. The long spikes of pale greenish white flowers are very sweet scented. Propagated by division.

SAPINDUS (Sapindaceæ) *emarginatus*. The Soap nut. Rhita. A tall tree, very common in the upper Provinces, furnishes the soap nut used so largely by the natives. Propagated by seed.

SCHINUS (Anacardiaceæ) *terebinthefolius*. A tall shrub which furnishes the Terebinth used in scenting soaps etc. Propagated by layers.

SCHISMATOGLOTTIS (Aroideæ). Dwarf ornamental foliage plants like Dieffenbachia. Propagated by cuttings.

SCHIZOLOBIUM (Leguminoseæ) *excelsum*. A very tall handsome ornamental tree, each leaf, like an exaggerated Poinciana leaf, measures sometimes 6 feet. The long tapering trunk is very brittle and snaps easily in a high wind. Propagated by seeds.

SCUTELLARIA (Labiateæ) *discolor*. A dwarf ornamental plant with greyish green foliage having the under surface bright maroon red, largely used in rockeries, hanging baskets etc. Propagated by cuttings.

SERICOGRAPHIS (Acanthaceæ) *ghicsbreghtiana*. A dwarf flowering shrub with scarlet flowers. Propagated by cuttings.

SERISSA (Rubiaceæ) *fœtida*. Taramani. A low growing shrub with very small double white flowers having an unpleasant odour. Propagated by layers.

SHOREA (Dipterocarpeæ) *robusta*. The Sal tree. A tall tree supplying the valuable timber so largely used as railway sleepers etc. Propagated by seeds.

SIPHONANTHUS (Verbenaceæ) *indica*. A handsome flowering shrub with curious shaped creamy white flowers and bright red filaments. The flower unfortunately only lasts from sunset to sunrise. Propagated by layers.

SMILAX (Liliacæ) Kumira. *macrophylla*. The foliage of the variety is handsomely blotched with white. It is a climber but very untidy. Propagated by seeds.

SOLANDRA (Solanaceæ) *grandiflora magnifica*. A rather straggling shrub bearing handsome white Beaumontia-like flowers. Propagated by layers.

SOLANUM (Solanaceæ) Potatoe creeper. These creepers are well worth growing. *jasminoides* has white jasmine-like flowers, *Seafortheanum*, blue and *Wendlandii* is rather a heavy growing creeper with large trusses of blue flowers. Propagated by layers.

SOLIDAGO (Compositeæ) Golden Rod. *canadensis*. A rather untidy growing plant which sends up long shoots covered with small deep golden yellow flowers. Propagated by division.

SPARAXIS (Irideæ) *bulbifera.* Dwarf bulbous plants with handsome iris-like flowers of various colours. Propagated by bulbs.

SPATHELIA (Simarubeæ) *simplex.* A dwarf ornamental foliage plant with finely divided leaves. Propagated by seeds.

SPATHODEA (Bignoniaceæ) *campanulata.* A very tall tree with masses of orange scarlet flowers. Unfortunately the beauty of this tree is lost owing to the flowers being produced very high up. Propagated by offsets or root cuttings.

SPIRONEMA (Commelinaceæ) *fragrans.* A dwarf succulent, like *Tradescantia discolor* with green leaves, which produces small white sweet scented flowers. Propagated by offsets.

SPREKELIA (Amaryllideæ) *formosissima.* Jacobian Lily. An Amaryllis like lily with brilliant crimson coloured flowers only differing from Amaryllis in the shape of petals. Propagated by offsets.

STACHYTARPHETA (Verbenaceæ). This shrub, if kept well trimmed, is very ornamental when it flowers. The long spikes of blue, red and purple verbena-like flowers are very effective but only last a day, to be succeeded by fresh ones next day. Propagated by cuttings.

STAPELIA (Asclepiadeæ) Star-flowers. Dwarf cactus-like plants; the flowers emit an overpowering smell of filth and attract flies, they are curiously spotted purple on a green ground. Propagated by cutting.

STEPHANOTIS (Asclepiadeæ). The Creeping Tuberose. This well-known creeper needs little description as it is so largely grown everywhere. The flowers are strongly scented,

borne in clusters. *Elvaston variety* differs from *floribunda*, in having the mid rib pink and bigger bunches of flowers. Propagated by layer cutting and seed.

STERCULIA (Sterculiaceæ) Bodela. Tall trees with ornamental foliage. Some of the varieties produce almond like seed, which are eaten by the natives. Propagated by seeds.

STIGMAPHYLLON (Malpighiaceæ). Handsome flowering creepers. The individual flowers are like those of the Banisteria only larger. Propagated by layers.

STRELITZIA (Scitamineæ). Plantain like plants, with curious orange and purple flowers. Propagated by seeds.

STROBILANTHES (Acanthaceæ). Dwarf ornamental leafed shrubs. *Dyerianus* is the handsomest and is blotched with metallic purple. Propagated by cuttings.

STRYCHNOS (Loganiaceæ) *Nuxvomica*. Kunchila. Strychnine tree. The poison is extracted from the flat seed which is contained in a red fruit. The plant when in full leaf is very handsome. Propagated by seed.

STYLOCORYNE (Rubiaceæ) *Webera*. A dwarf Ixora like plant with greenish white, sweet scented flowers. Propagated by layers.

SWEITENIA (Meliaceæ) *Mahogani*. This is the Mahogany of commerce, while *macrophylla* is the basterd Mahogany. Both grow into very tall trees and are largely used for avenue planting but are of slow growth. Propagated by seeds.

SYNGONIUM (Aroideæ) *Wendlandii*. A very broad leafed epiphyte, the flower spathe is white with a deep red base and has a very strong spicy scent. Propagated by cutting.

THE FLOWER SHOW.

18th and 19th February 1911.

After a lapse of nine years the Council of the Society decided to resusitate the Annual Flower, Fruit and Vegetable Show and with this in view notices were sent to likely exhibitors and native gardeners while advertisements appeared in the daily papers.

The prizes were made very liberal but unfortunately entries in many sections being poor, several awards were given merely to encourage exhibitors.

The tents which are kindly lent us by His Excellency the Commander-in-chief and His Honor the Lieut-Governor were arranged in a circle round the tennis lawn, the entrance to the enclosure being between the Ficus comosa and Casuarinas.

As His Excellency the Viceroy was unable to attend, the Show was opened by Her Excellency Lady Hardinge at 3 P. M. on Friday, the 18th, after which the public were admitted. A band from the XXVII Punjabis played selections during the afternoon. The entrance to the enclosure lay between rows of palms, crotons etc., leading up to two banks of rare and ornamental plants including Farleyense, thickly interspersed.

The Marquee on the left was occupied by Seth Dooly Chund's Exhibit and contained in two groups, large numbers of rare palms, foliage plants and orchids artistically arranged in a semicircle, around a miniature lake. Messrs. F. H. Eggar, the Hon'ble A. A. Apcar C. I. E. and J. Stephen also staged fine groups for competition.

The collections of palms, dracænas, ferns etc., contained many new acquisitions while two masses of Ad Farleyense staged by Mr. Geo. Girard and Mohendro Mali were greatly admired.

The Society had a group of rare and valuable plants which proved an attraction, also a large number of fine specimen Crotons and Dracænas.

A few of the many new varieties of Hybrid Hibiscus introduced by the Society, were shewn to advantage on a long table and several of the newest roses in their unique collection. Mrs. Seth Apcar had some very interesting exhibits—several anemones in flower grown in Calcutta and a stand of fine strawberries—the fruit was pronounced by an expert *as being able to compare favourably* with any produced at Home. Her Excellency Lady Hardinge was particularly interested in this exhibit and at her request Mrs. Seth Apcar cut several fine strawberries for Her Excellency's daughter, who had been unable to attend the show.

The Royal Botanic Gardens, Sibpur, exhibited some fine specimens of Cactus, Orchids and other plants but many rare plants were damaged in transit.

In the cut flower section the exhibits were exceptionally poor and competitors few: and though the collection of orchids shewn by Mr. C. Chatterjee were good the Camellias shown were not up to much.

Among the vegetables, the Cauliflowers, Cabbages, Carrots, Turnips and Potatoes were good but the fruit was not quite up to mark.

Messrs. Kilburn & Co., had a show case of Soya bean, Soya flour and biscuits etc., which exhibit interested many of the visitors.

The Department of Agriculture, Pusa, displayed silk and the products of the silk worm as well as some simple machines for reeling and carding which they recommended.

Table decorations—there were eight competitors in this section, and some of the colour schemes were very pretty. Unfortunately the heat spoilt the Poppy and Corn flower effects so that by evening the beauty of the decorations was quite lost.

In the quadrangle a large shamiana was erected for tea for the members of council and their friends and Messrs. Peliti & Co. catered.

The annuals in pots occupied a large space and asters, petunias and verbena were of exceptional merit. The few groups of annuals were very poor but Mr. Petrocochino's exhibit of wall flower was awarded a special prize.

The Department of Agriculture occupied two large shamianas with an interesting exhibit of cereals and economic crops etc. The actual manufacture of ghur was carried on near by, while several ploughs and rakes recommended by the Department were on view. Great credit is reflected on Mr. E. J. Woodhouse, M.A., the Economic Botanist to Government of Bengal for the difficult task of bringing the exhibit together and its excellent arrangement.

The crowds always near this section proved the keen appreciation of the visitors.

Messrs. T. E. Thomson & Co., and W. Leslie & Co., staged groups of garden requisites, and Messrs. Burn & Co., erected a chain pump, of easy manipulation, on one of the banks of the front tank.

The Judges were—

MAJOR A. T. GAGE, M.A., M.B., I.M.S., F.SC.
GEO. GIRARD, ESQ., F.R.H.S.
G. T. LANE, ESQ.
J. T. JOHNSON, ESQ.
F. H. ABBOTT, ESQ.
H. ST. JOHN JACKSON, ESQ.
S. P. CHATTERJEE, ESQ., F.R.H.S.
BABU AMBICA CHARAN LAW.
R. C. GHOSH, ESQ.

ORDINARY PRIZE LIST.

CLASS A.

No.		Prize	Awarded to		Amount.
	Orchid	... 1st	Seth Dooly Chund	...	10
	Do.	... 1st	Do.	...	6
3	Do.	... 1st	Do.	...	6
4	Camellias	... 1st	The Hon'ble Mr. A. A. Apcar	...	6
5	Ferns	... 1st	Seth Dooly Chand	...	12
6	Do.	... 1st	Do.	...	12
7	Do.	... 1st	Do.	...	5
8	Do.	...	No competition.		
9	Begonias	...	Do.		
10	Do.	...	Do.		
11	Draceenas	... 1st	Seth Dooly Chand	...	6
	Do.	... and	Mohendro Nath Mahapatra	...	4
12	Do.	... 1st	Do.	...	3

No.		Prize	Awarded to	Amount.
13	Rare & ornamental plants...		No competition.	
14	Camellias ...	1st	The Hon'ble Mr. A. A. Apcar ..	5
15	Roses ..	1st	G. D. Coondoo Chaudhry ...	12
16	Do. ..	1st	Do. ...	12
17	Do. ...	1st	T. C. Chaudhry ...	3
18	Do. ...	1st	Chuni Lal Banerjee ...	3
19	Cut flowers ..		No competition.	
20	Annuals ...	1st	Chuni Lal Banerjee ...	10
	Do. ...	2nd	A. Stephen, Esq. ..	6
21	Bridal Bouquet	1st	S. M. Tewary .	6
	Do. .	2nd	C. Das ...	4
22	Ball room Do ...	1st	Do. ...	6
	Do. ...	2nd	S. M. Tewary ...	4
23	Annuals or Perennials ...		No competition.	

CLASS B.

No.		Prize	Awarded to	Amount.
1	Roses ...		No competition	
2	Do. ...		Do.	
3	Do. ...		Do.	
4	Do. ..		Do.	
5	Coleus	1st	Koilash Mali ..	5
6	Verbena ...	1st	Mohendro Nath Mahapatra ...	5
	Do. ...	2nd	Jogin Mali ...	4
7	Dianthus ...	1st	Koilash Mali ...	5
	Do. ...	2nd	Capt. C. Marindin ...	4
8	Pansy .	1st	Koilash Mali ...	5
	Do. ..	2nd	Mohendro Nath Mahapatra ...	4
9	Petunia ...	1st	Mohendro Nath Mahapatra ...	5
10	Do. ...	1st	Do. ...	5
11	Phlox ...	1st	Koilash Mali ...	5
	Do. ...	2nd	Capt. C. Marindin ...	4
12	Portulaca ...	2nd	Koilash Mali ...	4

No.		Prize	Awarded to		Amount.
13	Portulaca	... 1st	Koilash Mali	...	5
14	Nasturtiums	... 1st	Do.	...	5
15	Mimulus	...	No competition.		
16	Carnations	... 1st	Do.	...	5
	Do.	... 2nd	Calcutta Turf Club	...	4
17	Poppy	...	No award.		
18	Violets	...	Do.		
19	Dahlias	...	Do.		
20	Geranium	... 1st	Haroo Mali	...	5
	Do.	... 2nd	G. Girard, Esq.	...	4
21	Mignonette	... 2nd	The Hon'ble Mr. A. A. Apcar	...	4
22	Heliotrope	...	No award.		
23	Do.	...	Do.		
24	Creepers	...	Do.		
25	Annuals	... 1st	Koilash Mali	...	10
	Do.	... 2nd	Calcutta Turf Club	...	6
26	Do.	... 1st	Mohendro Nath Mahapatra	...	20
	Do	... 2nd	Koilash Mali	...	15

CLASS C.

...		Prize	Awarded to		Amount.
1	Artichoke	... 1st	Hari Hazra	...	4
	Do.	... 2nd	Rakhal Hazra	...	3
2	Brocoli	... 1st	Kunja Behary Das	...	4
3	Beet	... 1st	Kedar Sansmal	...	4
	Do.	... 2nd	Bolye Sansmal	...	3
4	Brussels sprouts	1st	Aubhoy Hazra	...	4
5	Cabbage	... 1st	Bhupati Hazra	...	5
	Do.	... 2nd	Kedar Sansmal	...	3
6	Cauliflower	... 1st	Madhub Das	...	5
	Do.	... 2nd	Pran Kristo Das	...	3
7	Carrot	... 1st	Naran Hazra	...	3
	Do.	... 2nd	Bhut Nath Bera	...	2
8	Celery	... 1st	Naran Hazra	...	4
	Do.	... 2nd	Indro Mohan Bera	...	3

No.		Prize	Awarded to		Amount.
9	Cucumber	... 1st	Mohendro Nath Das	...	3
	Do.	... 2nd	Bhut Nath Das	...	2
10	French Bean	... 1st	Babulal Adak	...	3
	Do.	... 2nd	Hera Lal Adak	...	2
11	Knol kohl	... 1st	Indro Mohon Bera	...	3
	Do.	... 2nd	Babulal Adak	...	2
12	Lettuce	... 1st	Madhub Hazra	...	3
	Do.	... 2nd	Mohesh Chandra Adak	...	2
13	Indian corn	... 2nd	Narain Hazra	...	2
14	Peas	... 1st	Do.	...	5
	Do.	... 2nd	Hera Lal Adak	...	4
15	Potato	... 1st	Radha Nath Dhara	...	3
	Do.	... 2nd	Gosto Behary Bera	...	2
16	Tomato	... 1st	Indro Mohon Bera	...	3
	Do.	... 2nd	Behary Lal Bera	...	2
17	Do.	...	No award.		
18	Radish	... 1st	Jogindra Bera	...	3
	Do.	... 2nd	Mohesh Chandra Adak	...	2
19	Turnip	... 1st	Rakhal Hazra	...	3
	Do.	... 2nd	Gopi Nath Bera	...	2
	Do.	... Extra	Naran Hazra	...	2
20	Spinach	...	No award.		
21	Vegetable Marrow	...	Do.		
22	Squash	...	Do.		
23	Gourd	... Do.	Moharajadhiraj of Burdwan	...	3
24	Best Dali of veg.	1st	Uttam Sansmal	...	5

CLASS D.

No.		Prize	Awarded to		Amount.
1	Pineapple	... 1st	Radha Nath Dhara	...	3
	Do.	... 2nd	Jogesh Chandra Chandra	...	2
2	Papaya	... 1st	Rye Charan Das	...	3
	Do.	... 2nd	Jamal Jairaj	...	2
3	Bael	... 1st	Moharajadhiraj of Burdwan	...	3
	Do.	... 2nd	Bhut Nath Das	...	2

No.		Prize	Awarded to	Amount.
4	Cocoanut ...	1st	Ananta Coomar Das ...	3
	Do. ...	2nd	Moharajadhiraj of Burdwan	2
5	Guava ...	1st	Mohendro Nath Das ...	3
	Do. ...	2nd	Radha Nath Mytee ...	2
6	Limes & Lemons	1st	Radha Nath Dhara ...	3
	Do. ...	2nd	Sasi Bhusan Mundle ...	2
7	Plum long ...	1st	Do. ...	3
	Do. ...	2nd	Dino Nath Das ...	2
8	„ Do. round ...	1st	Jogesh Chandra Chandra ...	3
9	Plantain ...	1st	Radha Nath Mytee ...	6
	Do. ...	2nd	Radha Nath Dhara ...	4
		Extra	Sosi Bhusan Mundle ...	2
10	Pomelo ...	1st	Jogesh Chandra Chandra ...	5
	Do. ...	2nd	Radha Nath Dhara ...	3
11	Sapota ...	1st	Behary Lal Bera ...	3
12	Tiparee ...	1st	Radha Nath Dhara ...	3
	Do. ...	2nd	Do. Mytee ...	2
13	Oranges ...		No award.	
14	Do. ...		Do.	
15	Apples ...		Do.	
16	Grapes ...		Do.	
17	Do. ...		Do.	

VEGETABLES.

No.		Prize	Awarded to	Amount.
29	Landreth's Collection	1st	Kristo Sansmal ...	20
	Do. ...	2nd	Prem Chand Das ...	15
	Do. ...	3rd	Indro Bera ...	10
	Do. ...	4th	Rakhal Hazra ...	8
	Do. ...	5th	No award.	
	Do. ...	6th	Do.	
30	Sutton's Do. ...	1st	Kristo Bera ...	40
	Do. ...	2nd	Hari Ch. Hazra ...	20
	Do. ...	3rd	Bulai Sansmal	10
31	Landreth's Best	1st	Ananta Das	4

No.		Prize	Awarded to	Amount.
32	Bean	... 1st	Balai Sansmal	... 2
33	Cabbage	...	No award.	
34	Cabbage	... 1st	Troylucco Das	... 2
35	Carrot	... 1st	Upendro Bera	... 4
36	Celery	... 1st	Hera Lal Adak	... 4
37	Cucumber	...	No award.	
38	Pepper	...	Do.	
39	Water melon	... 1st	Jogesh Ch. Chandra	... 2
	Do.	... Extra	Bhutnath De	... 2
40	Cantaloupe	...	No award.	
41	Onion	...	Do.	
42	Raddish	..	Do.	
43	Tomato	... 1st	Bhutnath Bera	... 4
44	Do.	...	No award.	
45	Do.	...	Do.	

SPECIAL PRIZES.

1. The best collection and most tastefully arranged group of *well-grown plants*.

FIRST PRIZE. A Silver Cup *presented by* His Excy. the Viceroy and Governor-General of India and Rupees 50 by Messrs. Jardine Skinner & Co. Seth Dooly Chand.

SECOND „ Rupees 20 *presented by* the Society. F. H. Eggar, Esq.

2. The best collection and most tastefully arranged group of *plants*, foliage, or flowering, or both, of any number of kinds.

FIRST PRIZE. A Silver Medal *presented by* H. H. the Lieut.-Governor of Bengal and Rupees 50 *presented by* Hon'ble A. A. Apcar, C.I.E.
Seth Dooly Chand.

SECOND „ Rupees 20 *presented by* the Society.
A. Stephen Esq.

3. The best collection of *well-grown Palms*, not less than 18 dissimilar kinds.

FIRST PRIZE. Rupees 50 *presented by* His Excellency the Commander-in-Chief.
Justice Holmwood.

SECOND „ Rupees 10 *presented by* the Society.
Mohendro Nath Mahapatra.

4. The best collection of *Dracœnas*, not less than 12 choice dissimilar kinds.

FIRST PRIZE. Rupees 50 *presented by* the Hon'ble the Chief Justice of Bengal.
Bairagi Mali.

SECOND „ Rupees 10 *presented by* the Society.
Mohendro Nath Mahapatra.

5. The best collection of *well-grown Crotons*, not less than 18 dissimilar kinds.

FIRST PRIZE. Rupees 25 *presented by* the Tollygunge Club.
Justice Holmwood.

SECOND „ Rupees 10 *presented by* the Society.
No award.

6. The best collection of *Orchids* in flower, not less than 10 dissimilar kinds

FIRST PRIZE. Rupees 50 & a Silver Medal *presented by* the Hon'ble Sir Bijay Chand Mahtab, Maharajadhiraj Bahadur of Burdwan, K.C.I.E., I.O.M.

Mr. G. Chatterjee.

SECOND „ Rupees 25 *presented by* Raja Peary Mohan Mookerjee, C.I.E.

Babu A. C. Law.

7. The best collection of *well-grown Ferns.*

FIRST PRIZE. Rupees 50 *presented by* Shirley Tremearne, Esq.

Seth Dooly Chand.

SECOND „ Rupees 20 *presented by* the Society.

F. H. Eggar, Esq.

8. The best collection of six *Ferns*, six varieties, true to name.

FIRST PRIZE. Rupees 25 *presented by* the Tollygunge Club.

Seth Dooly Chand.

SECOND „ Rupees 10 *presented by* the Society.

Bairagi Mali.

9. The best collection of *Adiantum Farleyense.*

PRIZE. Ths Society's Silver Medal and Rupees 16 *presented by* H. H. the Maharaja of Durbhanga, K.C.S.I.

Mohendro Nath Mahapatra.

10 The best decorated *table* for 8 persons.

FIRST PRIZE. Silver Rose Bowl value Rupees 100 *presented by* F. H. Eggar, Esq.

Mrs. Thompson.

SECOND PRIZE. A handsome table centre piece *presented by* Messrs. Boseck & Co., value Rupees 50.
Mrs. C. W. Walsh.

11. The best collection of *cut-flowers* of Perennial Shrubs other than Roses and Chrysanthemums.

FIRST PRIZE. Rupees 25 *presented by* R. Thomas, Esq.

SECOND „ Rupees 10 *presented by* the Society.
No Competition

12. The best collection of *cut-Roses, (Amateurs only.)*

FIRST PRIZE. A Silver Medal *presented by* Nawab Nasirul-mamalek, Persian Consul General and Rupees 10 *presented by* the Society.
Babu Chuni Lal Banerjee.

SECOND „ A Silver Vase *presented by* Messrs. Girish Chandra Dutt & Sons.
Bairagi Mali.

13 The best collection of 12 *cut-Roses*, of 12 varieties, true to name.

FIRST PRIZE. Rupees 32 *presented by* Sir Ernest Cable.
Babu Chuni Lal Banerjee.

SECOND „ Rupees 10 *presented by* the Society.
Babu G. D. Coondoo Chaudhury.

14. The best collection of *cut-Tea Roses*, true to name.

PRIZE. Rupees 16 *presented by* Kilian Euler, Esq.
Babu J. C. Chaudhury : Maharajadhiraj of Burdwan.

15. The best collection of *cut-Hybrid Perpetual Roses.*

FIRST PRIZE. The Grant Silver Medal and Rupees 25 *presented by* Dudley Meyers, Esq.
Babu N. N. Mukerjee.

SECOND „ Rupees 10 *presented by* the Society.
No award.

16. The best collection of *cut Canna*, 12 varieties.

FIRST PRIZE. Rupees 20 *presented by* Babu Ambica Charan Law.
Mohendro Nath Mahapatra.

SECOND „ Rupees 10 *presented by* the Society.
No award.

17. The best collection of *cut annuals.*

FIRST PRIZE. Rupees 30 *presented by* H. H. The Maharaja of Cooch Behar, K.C.S.I.
Mohendro Nath Mahapatra.

SECOND „ Rupees 10 *presented by* the Society.
Capt. C. Marindin.

18. The best collection of *bulbous or tuberous rooted plants* in flower not less than 12 dissimilar kinds *(Amateurs only.)*

FIRST PRIZE. Rupees 25 *presented by* A. K. Basu, Esq., F.R.H.S., and the Society's Silver Medal.

SECOND „ Rupees 10 *presented by* the Society.
No Competition.

19. The best collection of *well-grown Anthuriums.*

PRIZE. Rupees 10 *presented by* the Society.
Seth Dooly Chand.

20. The best collection of *Cannas* (in flower), 12 different kinds in pots.

FIRST PRIZE. Rupees 25 *presented by* the Hon'ble Mr. W. R. Gourlay, I.C.S.
Mohendro Nath Mahapatra.

SECOND „ Rupees 10 *presented by* the Society.
Jogen Mali.

21. The best collection of *Roses* in flower, growing plants in pots, not less than 12 different kinds.

FIRST PRIZE. A Silver Medal *presented by* Rai Hariram Goenka Bahadur, and Rupees 25 *presented by* Mr. S. Bose.

SECOND „ Rupees 10 *presented by* the Society
No Competition.

22. The best collection of *Tea-Roses*, in flower, growing plants in pots, not less than 12 different kinds.

FIRST PRIZE. A Silver Medal *presented by* Babu K. C. Bose and Rupees 15 *presented by* Rai Bahadur P. C. Banerjee.

SECOND „ Society's Bronze Medal and Rupees 5.
No Competition.

23. The best collection of *Hybrid Perpetual Roses* in flower, growing plants in pots, not less than 12 different kinds.

FIRST PRIZE. A Silver Medal *presented by* Rai Bahadur Lalit Mohan Sinha Ray and Rupees 15 *presented by* G. Hasenbalg, Esq.

SECOND „ Rupees 10 *presented by* the Society.
No Competition.

24. The best collection of *Asters*, raised from Sutton's Seeds by the Exhibitors. *Presented by* Messrs. Sutton and Sons, Seedsmen, Reading.

FIRST PRIZE. ... ... Rs. 10
Mohendro Nath Mahapatra.

SECOND „ ... ... Rs. 8
Jogen Mali.

THIRD „ ... ... Rs. 6
Koilash Mali.

FOURTH „ ... ... Rs. 4
No Award.

25. The best collection of *Asters*, raised from Carter's Seeds by the Exhibitors. *Presented by* Messrs. J. Carter & Co., Seedsmen, London.

FIRST PRIZE. ... ... Rs. 12
Mohendro Nath Mahapatra.

SECOND „ ... ... Rs. 10
Jogen Mali.

THIRD „ ... ... Rs. 8
Koilash Mali.

26. The best collection of *Annuals Bulbous* or *Herbaceous* plants in flower. All specimens to have been grown by the Exhibitor.

PRIZE. Rupees 25 *presented by* the Hon'ble Mr. W. R. Gourlay, I.C.S.
No Competition.

27. The best collection of *Annuals* not less than 50 pots. All specimens to have been raised by the Exhibitor from Carter's Seeds.

Presented by Messrs. J. Carter & Co., London.

FIRST PRIZE. ... ... Rs. 32

SECOND „ ... ... „ 15

No award.

28. The best collection of *Vegetables* and *Fruits*, Vegetables 20 kinds and Fruits 12 kinds.

FIRST PRIZE. Rupees 25 *presented by* The Burdwan Raj.

SECOND „ Rupees 15 *presented by* Rai Bahadur Lalit Mohan Sinha Ray.

No Award.

28. (*a*) The best exhibit of *Agricultural* and *Gardening implements*, etc.

FIRST PRIZE. The Society's Silver Medal.

Messrs. T. E. Thomson & Co.

SECOND „ The Society's Bronze Medal.

Messrs. W. Leslie & Co.

INTERESTING REFERENCES.

STRAWBERRIES AND HOW TO GROW THEM.

"THE GARDEN."

The Strawberry is a fruit by itself, inasmuch as it is produced on herbaceous plants, instead of trees or hard-wooded plants as are the rest of our fruits. For that reason its culture differs to some extent from that of any other kind of fruit grown in our gardens, and it may be regarded as an ideal subject for the amateur to take up. In preparing the soil for the beds it ought to be dug from 18 inches to 2 feet deep, and a heavy dressing of partially decayed manure well mixed with it, particularly in the top spit, as the work proceeds. Strawberries are gross-feeding plants, and quickly show signs of any scarcity of food, If, as is usually the case, the site selected for the bed was dug two spits deep and then cropped with early Potatoes, it will suffice if it is given a good dressing of manure and well dug one spit deep. There is no doubt whatever that the best time of the whole year for planting new beds is during August and the early part of September, and to enable this to be done, the earliest runners that form must be layered. By planting at the season named, the plants get well established before the winter, and will give a medium crop of first-quality fruits the following summer. Failing the period named, some growers resort to spring planting; but it is not wise to allow plants put in at that season to crop the following summer. Consequently a whole year is lost.

Before going further, the layering of young plants must have attention. This is one of the easiest operations in fruit-growing, yet it is one that the amateur is apt,

through ignorance, to make fatal mistakes over. It has already been stated that early layering should be resorted to, and the very first runners, or stolons, that appear on the plants must be carefully looked after. Many growers advise the retention of a few plants solely for this purpose, the flowers of which are picked off as they appear. Where possible, this method is certainly advisable, as the whole vigour of the plant is thrown into the runners. Good and early runners can usually be secured from young plants that are bearing fruit; but care must be taken to avoid layering young plants from those parents which are barren. In a bed of Strawberries there is almost certain to be a few plants that do not produce flowers, and such are frequently prolific in runners, which, if layered, are likely to inherit this undesirable trait of their parents.

The ideal method of layering is to peg the young plantlets on to soil that has been placed in 3-inch pots. This may either be good prepared potting soil or, if the natural soil of the bed is fairly light and easily worked, this may be used. Drainage in the bottom is not necessary, but may be used if desired.

When filled, the pots should be plunged to their rims in the soil between the rows of plants, and the plantlets pegged into the soil with large hair-pins or small wooden pegs, or, failing either of these, a good-sized stone may be laid on the runner close to the plantlet, the object being to keep the latter in position until rooted. Squares of turf are sometimes used, and a slipshod method is to let the plantlets root in the bed and then lift them, a serious check being the result. For forcing purposes the young plants are sometimes layered into properly-drained 5-inch or 6-inch pots. After layering, the soil in the pots should be kept moist by watering if the weather proves dry,

and in a fortnight or three weeks the soil in the pots will be filled with roots When the young plants have reached this stage they are ready to be severed from the parents, which is easily done by cutting through the runner on each side of the pot. If left on the parents too long, the young plants will root through the bottoms of the pots, and their removal then will cause a severe check to growth. After they are taken from the beds, stand the pots containing the plants in a shady position for a week or ten days, and see that they do not suffer for the want of water, a light damping overhead morning and evening assisting them very much during hot weather. When they have quite recovered from the slight check that is inevitable in their removal, the young plants are ready to go to their permanent quarters, and the earlier they are planted the better in every way.

The actual planting is an important operation, much more so than is usually recognised. More failures are due to indiscreet planting than any other cause, it being an easy matter to plant a little too deeply or not quite deep enough, both errors being prolific sources of failure. Previous to the plants being put in, the soil should have had ample time to settle, and if at all sandy should be well trodden down, as Strawberries delight in a firm rooting medium. The soil must also be made firm around the roots, and if the soil is dry it well repays the grower to water the plants freely until well established.

The distance apart to plant will depend largely upon the method of culture to be adopted. During recent years some of our best growers have grown Strawberries as biennials, *i.e.*, the young plants are planted one summer, allowed to fruit the next, and are then destroyed, a new bed being prepared each year. By so doing larger and somewhat

earlier fruits are secured. When this system is adopted, the rows may be 18 inches apart and the plants in the rows 15 inches asunder. The more general practice, however, is to allow the beds to remain for three years, and then the rows ought to be 2 feet 6 inches apart and the plants 18 inches or more asunder.

When established, all runners, except any required for propagating purposes, must be cut off as soon as they appear, so as to concentrate the energy of the plants to the production of fruit. The question of manuring the beds is an important and debatable one, some growers advising autumn manuring and others spring. I have tried both, and have come to the conclusion that early March is the best. At that time a 6-inch-thick layer of rather long, partially-decayed manure should be neatly spread between the rows. The plants are just beginning to get active, and as the nutriment is washed down into the soil the roots are in a fit condition to make use of it. By the time the fruits are swelling freely, the straw will have been washed clean and will prevent the ripening fruits being splashed with soil. If necessary, more clean straw may be added, but avoid the natural temptation to use the grass from the lawn for the purpose. If the weather is at all wet, it will cause the fruits that rest upon it to quickly decay. Just when the berries have set it pays to give each plant about half a teaspoonful of finely-crushed nitrate of soda or sulphate of ammonia, scattering it round the crowns and underneath the foliage. It assists the fruit to swell and brings out the colour.

The autumn-fruiting Strawberries, represented by such varieties as St. Antoine de Padoue and St. Joseph, ought to be grown much more extensively than they are at present. Their treatment is practically the same as that

advised for the su mmer-fruiting varieties, except that all flowers should be removed until about the middle of July, so as to induce the plants to flower and fruit freely during the autumn months. In addition to the two varieties previously mentioned, there is now an excellent new autumn Strawberry named Laxton's Perpetual. The list of summer-fruiting varieties is a large one, but for general purposes Royal Sovereign has not yet been beaten. For flavour British Queen has long held premier place, but it does not thrive in many gardens, and on that account is not recommended for amateurs. A new variety of similar flavour and much better cropping qualities is Epicure. Sir Joseph Paxton, President, The Laxton, Cropper, The Bedford, George Monro and Connoisseur are other good sorts that may be recommended for general purposes. The four last named are comparatively new. A small-fruited, free-cropping Strawberry of exquisite flavour is Vicomtesse Hericart de Thury, a variety that customers who know it would always pay an extra penny per pound for. As a late variety I know of none better than Givon's Late Prolific. J. C.

EXHIBITS OF THE BENGAL AGRICULTURAL DEPARTMENT AT THE ALIPUR SHOW.

In connection with the exhibit of the Bengal Agricultural Department at the Show of the Agricultural and Horticultural Society at Alipore in February 1911, it may be of interest to the Members of the Society to have some record of the more important exhibits shown by the Agricultural Department. Mere lists of the two hundred

and fifty varieties of crops cultivated in the Province will probably not be of much interest to readers of the Journal, nor will lists of the maps and Entomological and Mycological show cases, so that it will be advisable to omit them. This leaves us with the catalogues of the crops, manures and implements which the Department recommends for trial in the Province. The labels on these exhibits sum up the results obtained by the Department with them, so that it is hoped that they will serve as a useful guide to persons who may wish to make trial of any of them,

With regard to the crops recommended by the Department, in the case of paddies it will be seen that the recommendations are confined to the finest varieties of paddy which have been proved to yield well and fetch high prices. The Department has not yet been able to undertake serious work on the classification of the hundreds of varieties in the Province owing to the small size of its staff and the large amount of preliminary work yet to be done at Sabour. Most of the other crops recommended are local varieties, obtained from localities where the crop does particularly well, and which has given consistently good results on the experimental farms. Many of these varieties tend to deteriorate if new seed is not obtained from the original locality at intervals, where the soil and climate appears to be particularly favourable to their growth.

The varieties of jute can be recommended to growers as having given extremely good results under the methods of cultivation practised on the jute growing farms. In Ground nut we have a crop which should be extremely valuable to landowners possessing much light sandy soil. Burhi cotton is likely to form a valuable crop to landowners in the hilly lands of the Sonthal Perghannahs, as its lint is

of extremely fine quality. Soybeans are under experiment, but at present the area sown in the Province is small and the bazar price is more than that offered by exporters. Further information on the crops recommended can be obtained from Mr. Smith, the Deputy Director of Agriculture, who is in charge of the Department's farms.

In the case of the manures exhibited it will be seen that Saltpetre is recommended for use as a dressing to stimulate the crop in growth, but it is a difficult fertilizer to apply as it may be washed away by heavy rain, or, if applied in excess, it may damage the crop. It has given good results at Burdwan. The oil cakes are a much more satisfactory manure and their use should be encouraged where ever possible to eke out the supply of cowdung. The fact that they yield their supply of plant food slowly makes them particularly valuable for use for perennial crops or in the rainy season. At Dumraon 40 mds. of cowdung and 3¼ mds. of castor cake have given a yield of 26 mds. paddy as compared with 16 mds. on the unmanured plot. We now come to the green manures, before which there is probably a great future both as a renovator of inferior lands, and for use on higher class lands as a basis for the supply of humus to increase the value of the more valuable cakes and artificials. The cost of green manuring is nominal so that this method for increasing the fertility of the soil is within the reach of every cultivator. At Dumraon 22 mds. of paddy per acre were obtained after green manuring with Sunn hemp as compared with 16 mds. on the unmanured plot. Further information on the subject of manures can be obtained from Mr. Taylor the Agricultural Chemist to Government.

Of the implements, the soil inverting ploughs are undoubtedly far superior to the local indigenous implements, especially for use in the monsoon season. In addition to

the Meston and Hindustan plough, a much larger type (of which the Raja plough can be obtained from Messrs. Volkart Brothers, Karachi and the Punjab form Messrs. Octavius Steele) has lately been introduced by Mr. Milligan of the Punjab. The Raja plough has been tested at Sabour and has given excellent results both in hot weather ploughing and especially in ploughing in green manures in the rains. It can plough down to 9" deep and requires one man and one pair of bullocks. Planet Junior Hoes are well worthy of trial by any one possessing even a moderate amount of kitchen garden; of the shares supplied, the knife blades should be used for cutting off weeds and the teeth for stirring the soil in the hot weather, while the plough shares are alone useful for killing weeds in the rainy season. The sugar pan and mill are now used throughout most of the Province, but they are exhibited to demonstrate the correct methods of using them. The Chain pump is a valuable water lift for lifts from 5 to 16 feet. Where larger quantities of water are required a bullock gear should be used. The dhone, if properly adjusted, is very efficient for lifts up to 5 feet, and is exhibited by the Department in areas where it is not now used.

The Allahabad Exhibition has been the cause of the introduction of a great number of new water lifts and other machines; and now that manufacturers have got some idea of what machinery is likely to meet with a good sale in India, I should like to remind them that it would probably be well worth their while to turn their attention to the numerous shows which are held every year in Bengal. In the course of my visits to these shows I have had many enquiries for pumps, paddy huskers, mills and other implements; it is probable that if manufacturers sent samples of ploughs, water lift and other machinery to these

Exhibitions for sale on the spot, they would find there was a demand for these machines, provided that they could set them up and start them working efficiently for the purchasers.

E. J. WOODHOUSE, M. A.,
Economic Botanist to the Govt. of Bengal.

CROPS RECOMMENDED BY THE DEPARTMENT OF AGRICULTURE, BENGAL.

1. **Fine Aus paddy.** (*Paddy.*) It is a fine aus paddy, suitable for highlands. The grain is long, fine and of a white colour, and is recommended for bhat. It may be sown broadcast or transplanted. At Cuttack it is broadcasted. This aus paddy has yielded an average of nearly 16 mds. per acre during the years 1905-07. The land received 7 ploughings, 8 ladderings and one weeding and the seed was sown on 4th June and harvested on September 18th.

2. **Dadkhany paddy.** (*Paddy.*) It is a very fine aman paddy, with white long grains, famous as a table rice and also suitable for polao. This paddy has given consistently good results during the past 5 years at Burdwan and is well worthy of trial. It commands a high price and ready sale, and has yielded 19¾ mds. of grain per acre on an average of 6 years at the Sibpur Experimental station.

3. **Banktulsi paddy.** (*Paddy.*) A fine aman paddy with long bright white grains. It is perhaps the best table rice in Bengal, commonly cultivated in brackish soils in the 24 parganas.

4. **Badshabhog paddy.** (*Paddy.*) It is a very fine scented paddy with broad white grains, used for polao and mistanna. It commands a high price and ready sale. The average yield at the Dumraon farm during 5 years has been 16 mds. of grain and 43 mds. of straw.

5. **Samundrabali paddy.** (*Paddy.*) A very fine scented aman paddy with broad white grain recommended for polao and mistanna, also used as bhat by rich people. It commands a high price. It has yielded $21\frac{3}{4}$ mds. of grain per acre on an average of 6 years at the Sibpur Experiment station.

6. **Muzaffernagar white wheat.** (*Grain*) In experiments made at the Dumraon Experiment station in the wheat growing area, seed was sown at the end of October, and the crop harvested in the first week of April. The land was ploughed twice in September, and three times in October with the local plough. It was harrowed twice in September and 3 times in October with the local harrow and weeded once with the khurpi in November. The land was irrigated once in November and once in January. The seed should be changed every second year. Cowdung and Poudrette (80 lbs.) are useful manurial applications.

7. **Red deshi wheat (U. P.)** *(Grain.)* This crop was treated similarly to the Muzaffernagar white wheat. It maintains its yield after the first year better than the Muzaffernagar wheat.

Dumraon oats. (*Grain.*) At the Dumraon Agricultural station this variety was compared with the Canadian Welcome oats for a number of years and its superiority has been proved. The average yields of grain per acre for 6 years (1903-08) of both the varieties are given below :—

Yield of Dumraon oats per acre, 23 mds. 13 seers.
Yield of Canadian oats per acre, 18 mds. 1 seer.

Saran Juar. (*Grain.*) Experiments made from 1902-03 to 1905-06 with Ambar, Sindhia, Nilwa, Impi and the local varieties of juar as fodder crops at Sripur farm in Saran District conclusively proved the superiority of Saran juar. This variety gave the highest yield every year and 394½ mds. of fodder per acre were obtained as an average yield.

Juanpur maize. (*Grain.*) This variety has been found to give the best results in experiments at the Sripur farm (Saran) where it has given an outturn of 20 mds. per acre.

Patna gram. (*Seeds.*) Outturn 12-14 mds. per acre. Seed rate 1 md. This is the common gram of Behar.

Saran rahar. (*Seeds.*) At Sripur farm an average yield of 6 mds. 17 seers of Rahar was obtained in 1906 to 1907. It was sown as a mixed crop with Maize.

Raipur (C. P.) Mustard. (*Seeds.*) This crop has given an average yield of 8 mds. per acre during the last 4 years and it has been found to be the best of the eleven varieties tested at Dumraon. At Dumraon the following practice is followed :—After harvesting Aus paddy or maize in September, plough, cross

plough and harrow the land once, then plough, cross plough and harrow again, when the land will be ready. Sow the seed broadcast at the rate of 5 seers per acre and ladder once to cover the seed properly. After cultivation consists of one weeding early in November, (at which time the plants can be thinned if too thick), and two irrigations, early in November and at the end of November.

Average results per acre 8 mands of seed at Rs. 6/-	...	...	...	Rs. 48/-
Cost of cultivation etc.		...	...	„ 19/-
Net profit	...	...	...	Rs. 29/-

14. Jabbalpur mustard. (*Seeds.*) This has been tested for 4 years at the Dumraon farm and when treated similarly to the Raipur mustard, gave $7\frac{1}{8}$ mds. per acre on an average of 4 years as compared with the 5 mds. per acre of the local mustard. Both Raipur and Jabbalpur mustard yield slightly more oil than the local variety.

15. Groundnut. (*Pods.*) This crop is cultivated on light sandy loam. The land should be in good tilth; and two seed should be sown together, 18 inches apart in furrows 18 inches apart, 20 seers of seed are required per acre. The seed should be sown at the beginning of the rains, and the land must be kept free from weeds and not allowed to cake. The crop cannot withstand frost, and if harvested early, a good fodder will also be obtained from the plants. The pods can be dug up with a kodali. At Cuttack an average of 10 mds. per acre was obtained.

16. Deswal of Serajganj. (*Seed.*) (*Corchorus capsularis*). This seed has given continuously good results on the Burdwan farm, yielding 30 mds. of fibre per acre in 1906, and an average of 22 mds. per acre during the 3 years 1904 to 1906.

16 (*a*). Deswal of Serajganj. (*Fibre.*) (*Corchorus capsularis*). This seed has given continuously good results on the Burdwan farm, yielding 30 mds. of fibre per acre in 1906, and an average of 22 mds. per acre during the 3 years 1904-1906.

17. Kakya Bombai (*Corchorus capsularis*). (*Seed.*) This seed has given continuously good results on the Burdwan farm, and for the 3 years 1904-06 yielded on average 25 mds. per acre.

17 (*a*). Kakya Bombai (*Corchorus capsularis*). (*Fibre.*) This seed has given continuously good results on the Burdwan farm, and for the 3 years 1904-06 yielded on averave 25 mds. per acre.

18. Barapat. (*Seed.*) This variety has given continuously good results at the Burdwan farm. An average yield of 23 mds. and 38 seers of fiber per acre was obtained during 3 years 1904-06.

18 (*a*). Barapat. (*Fibre.*) This variety has given continuously good results at the Burdwan farm. An average yield of 23 mds. 38 seers of fibre per acre was obtained during 3 years 1904-06.

19. Tosha (C. O.) of Pubna. (*Seed.*) At the Burdwan farm in 1907 and 1908 all the five selected varieties of *Corchorus olitorius* jute gave uniformly better results than the selected five *Capsularis* varieties of jute. Tosha is one of the 3 *olitorius* varieties which yielded

in 1908 30 mds. of fibre per acre the highest yield of the year. *Olitorius* (commonly called Deshi or Tosha) cannot bear water logging like the *Capsularis* varieties do. Consequently this variety should be always cultivated on high well drained lands.

19 (*a*). **Tosha (C. O.) of Pubna.** (*Fibre.*) At the Burdwan farms in 1907 and 1908 all the five selected varieties of *Corchorus olitorius* jute gave uniformly better results than the selected five *Capsularis* varieties of jute. Tosha is one of the 3 olitorius varieties which yielded in 1908 30 mds. of fibre per acre, the highest yield of the year. *Olitorius* (commonly called Deshi or Tosha) can not bear water logging like the *Capsularis* varieties do. Consequently this variety should be always cultivated on high well drained lands.

20. Burhi cotton. Burhi cotton is the best variety cultivated in Bengal. It is sown in June and July and harvested from November to January. Lint is strong and $1\frac{1}{8}$ inch long. Seed cotton give 30-32% of lint while the other cultivated varieties of Bengal yield 20-25% of lint. Lint sells at about Rs. 30/-per maund.

21. Nainital potato. This is a white fleshed heavy yielding variety which is preferred for European consumption. It has an average yield of 198 mds. per acre for the last 4 years at Burdwan. In cultivating potatoes it is essential that a heavy dressing of manure be applied 240 mds. of cowdung or $22\frac{1}{2}$ mds. of castor cake per acre have given the best results. Whole sets have been found best for planting. Potatoes have been rotated successfully with jute and other Bhadoi crops.

22. Patna potato. This potato is imported from Darjeeling and acclimatized at Patna. This is a

good floury potato, which has given heavy crops at Dumraon, Cuttack and Burdwan. It has given an average yield of 224 mds. per acre for the last 4 years at Burdwan.

23. Khari sugarcane. The results of experiments made at the Dumraon farm and other experimental stations show that Khari is a superior variety of cane. It can admirably resist drought, floods and the attacks of insects and wild animals. The average yield of chaki gur from Khari cane at Dumraon from 1906-08 was 51 mds., 36 seer per acre, while Mungo, the local best variety gave only 35 mds., and 33 seers. It is liable to be attacked by smut for which the best treatment is to select seeds from healthy localities where the disease does not appear. Sets from diseased canes should not be planted, nor diseased canes handled or stored with the healthy ones, selected for seed purpose. On the first appearance of the "smut" the diseased shoots or rather the entire clumps in which the disease has appeared should be carefully removed from the field and burnt. They should not be allowed to rot in the manure pits nor given to cattle as fodder.

24. Ikri sugarcane. This variety of cane is largely cultivated in flooded areas in East Bengal. It has been lately introduced into parts of Behar by the Agricultural Department, Bengal. The experiments made by several planters in Behar proved most successful in low lands subject to water logging during the rains. It is as hard as Khari consequently it can resist the attacks of insect pests and wild animals. Mr. Mylne of Behar who made experimements with Ikri and Mungo canes in 1906-1907 obtained 44 mds.,

16 seers of gur per acre from Ikri and 22 mds., and 8 seers of gur per acre from the local variety. It was noted by Mr. Mylne that Ikri cane was not attacked to any considerable extent by insects, while the local varieties were very badly affected by the insects.

MANURES RECOMMENDED BY THE DEPARTMENT OF AGRICULTURE, BENGAL.

REMARKS,

1. **Nitrate of Potash** (Saltpetre) It is valuable as a source of potash and nitrogen but should be used like sulphate of ammonia in small quantities. It contains 40 to 50% potash and 10 to 13% nitrogen according to its purity. A dressing of 1 maund and 20 seers per Bengal bigha (one third acre) in two dressings; one early in growth and the second in vigorous. This manure is very soluble and powerful and should be used with caution, as excess is likely to damage the crop. Two dressings of such a soluble manure are better than one, as, when once the manure is dissolved it is at once ready for use by the plant and at the same time may be washed away if the rain-fall is excessive.

2. **Bone meal.** It supplies phosphorus and also about three times as much nitrogen as is contained by cowdung and is a valuable manure. It has been used

at Burdwan together with saltpetre at the rate of 3 mds. of bone meal and one maund of saltpetre per acre and has given an increase of yield with paddy. This application will not necessarily be so successful elsewhere.

3. **Castor cake.** 20 mds. of castor cake per acre has been proved to be an economical application at Burdwan. At Dumraon 40 mds. of cowdung and 3¼ mds. of castor cake per acre gave 26 mds. of paddy as compared with 16 mds. on the unmanured plots and this may be considered an economical application. The value of these cakes depends on the completeness of the extraction of the oil, as the presence of the oil in excess retards the assimilation of the manure. It may be used before sowing or as a top dressing for crops that are standing for a considerable time. It is particularly valuable as it yields the plant food slowly and the manurial constituents are not likely to be removed rapidly from the soil by drainage. The cakes are specially valuable when sufficient cowdung is not available. It supplies 5 to 6% of nitrogen and a small amount of phosphoric acid and potash.

4. **Gingelly cake.** The value of these cakes depends on the completeness of the extraction of the oil as the presence of the oil in excess retards the assimilation of the manure. It may be used before sowing or as a top dressing for crops that are standing for a considerable time. It is particularly valuable as it yields the plant food slowly and the manurial constituents are not likely to be removed rapidly from the soil by drainage. The cakes are specially valuable when sufficient cow- dung is not available.

It supplies 5 to 6% of nitrogen and a small amount of phosphoric acid and patash.

5. **Safflower cake.** The value of these cakes depends on the completeness of the extraction of the oil as the presence of the oil in excess retards the assimilation of the manure. It may be used before sowing or as a top dressing for crops that are standing for a considerable time. It is particularly valuable as it yields the plant food slowly and the manurial constituents are not likely to be removed rapidly from the soil by drainage. The cakes are specially valuable when sufficient cowdung is not available. It supplies 5 to 6% of nitrogen and a small amount of phosphoric acid and potash.

6. **Mustard cake.** The value of these cakes depends on the completeness of the extraction of the oil as the presence of the oil in excess retards the assimilation of the manure. It may be used before sowing or as a top dressing for crops that are standing for a considerable time. It is particularly valuable as it yields the plant food slowly and the manurial constituents are not likely to be removed rapidly from the soil by drainage. The cakes are specially valuable when sufficient cowdung is not available. It supplies 5 to 6% of nitrogen and a small amount of phosphoric acid and potash.

7. **Dhaincha** (as green manure) It has given good results at Dumraon where 20½ mds. of paddy per acre were obtained after applying this manure, as compared with 16 mds. on the unmanured plot. The cost of the manuring is nominal, as the dhaincha seed is cheap. The land should be ploughed once or twice first, and the seed sown broadcast as early as

possible in the rains. When the young plants are about 3 feet high they should be ploughed in some 3 or 4 weeks before transplanting the paddy. It is even more valuable for rabi crops, as the land can be more thoroughly cultivated after the crop has been ploughed and the crop has more time to decay in the soil. The manure benefits the soil as follows :—

(*a*) Being leguminous plants they add to the quantity of nitrogen in the soil.

(*b*) The act of ploughing them in improves the tilth.

(*c*) Presence of the organic matter supplied by them also improves the consistency of the soil and assists the retention of moisture.

8. **Sunn Hemp** (as green manure) It has given good results at Dumraon where 22 mds. of paddy per acre were obtained as compared with 16 mds. on the unmanured plot. The land should be ploughed once or twice first, and the seed sown broadcast as early as possible in the rains. When the young plants are about 3 feet high they should be ploughed in some 3 or 4 weeks before transplanting the paddy, It is even more valuable for rabi crops, as the land can be more thoroughly cultivated after the crop has been ploughed in and the crop has more time to decay in the soil. The manure benefits the soil as follows :—

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(*b*) The act of ploughing them improves the tilth.

(*c*) Presence of the organic matter supplied by them also improves the consistency of the soil and assists the retention of moisture.

9. **Jute** (as green manure) Good results have been obtained with this treatment at Burdwan on paddy lands.

(*a*) The act of ploughing the crop in improves the cultivation.

(*b*) The presence of the organic matter supplied by them also improves the consistency of the soil and assists the retention of moisture.

The land should be ploughed once or twice first, and the seed sown broadcast as early as possible in the rains. When the young plants are about 3 feet high they should be ploughed in some 3 or 4 weeks before transplanting the paddy. It is even more valuable for rabi crops, as the land can be more thoroughly cultivated after the crop has been ploughed in and the crop has more time to decay in the soil.

IMPLEMENTS RECOMMENDED BY THE DEPARTMENT OF AGRICULTURE, BENGAL.

Remarks.

1. **Meston plough.** A cheap light iron soil-inverting plough, easily worked by a pair of ordinary bullocks. It has given the best results in experimental ploughs at the Cuttack Farm from 1906 to 1909, 35 mds. of paddy per acre were obtained as compared with 34½ mds. given by the land prepared with the Hindustan plough. Price Rs. 4-8.

2. **Hindustan plough.** This is an excellent plough for heavy land, but it is dear, costing Rs. 15. It differs from the country plough in that it inverts the soil. In experiments at Cuttack on the preparation of land for rice from 1906 to 1909 the land prepared by the Hindustan plough gave a yield of 34 mds. of paddy per acre as compared with an average of 32 mds. given by the Burdwan and 28 mds. by the Cuttack plough.

3. **Single wheel Planet Junior Hoe.** This implement is very useful for stirring surface soil, weeding and earthing up crops. It can be used for weeding along the rows of a crop sown in drills. Only one strong cooly is required to work it and it is found to do as much as 10 coolies weeding with khurpies. On wet land, it is advisable to use the plough share as it inverts the soil, kills the weeds and incidentally ridges up crop. The teeth are adopted for stirring dry soil and the knives for weeding in dry soil. It costs Rs. 17-8.

4. **Maize Huller.** This is a cheap American huller. price Rs. 7-8.

5. **Chaff Cutter** (*Simplex*) A good strong chaff cutter comparatively cheap. Two men can work it the whole day. At Sabour two and half maunds of juar stalk have been cut in an hour while two men in one hour with a couutry charasi could not cut more than half of the quantity obtained from the machine, besides the chaff of the machine cut is much finer and is eaten by the cattle with more relish. Price Rs. 30.

6. **Sugar turbine.** Not Exhibited.

7. **Flat iron pan for gur making.** In this flat evaporating pan the juice does not overflow, as in

the case of the country deep earthen pot. One man can look after the boiling process, while in the country system it requires at least 3 men. The colour of the sugar is excellent, while in the earthen pan the juice is always liable to burn along the sides which spoils the colour of the gur. Price Rs. 20.

8. **Banerji sugar mill.** This is an iron mill which extracts 68% of juice and can crush 140 lbs. of cane per hour. It can be worked by 2 pairs of Bengal bullocks alternately for an eight hour day, but a pair of bullocks can only work it 4 hours. Price Rs. 60.

9. **Chain pump,** This is a hand power chain pump when worked by two men can raise 1600 galons (200 mds.) of water per hour to a height of 12 feet. Price Rs. 45 to Rs. 60 each, the price depending on the length and width of the pipe used.

10. **Dhone.** This is a canoe shaped water lift used in the Burdwan division. It is replacing the same implement made of wood which has been used in lower Bengal from a remote period. In 10 hours 162,000 cubit feet water can be lifted with it. Price Rs. 8-8.

Hony. Member.—Major A. T. Gage, I.M.S.

The number of ordinary members added to the list during the year was 33 as compared with 23 during 1910.

The resignations have been 16 as compared with 19 during 1910. The loss by deaths has been 2, giving a net gain of 10 members.

The resignations are due to the usual causes, *viz.*, retirements from the country and change of residence with assumed loss of benefits from the Society.

Accounts.—The gross receipts of the Society for the year amounted to Rs. 40,878-11-2 as against Rs. 36,128-1-2 in 1910, showing an increase of Rs. 4,750-10-0.

Disbursements.—These aggregated Rs. 38,786-2-11 for the year as against Rs. 37,329-5-2 during 1910, showing an increase of Rs. 1,456-13-9.

Fixed Deposit.—The amount in the Bank at the close of the year 1911 was Rs. 15,200.

Aid.—The Council take the opportunity of again expressing their gratitude to Messrs. Mackinnon, Mackenzie & Co. for their continued support to the Society for granting free conveyance by their steamers to consignments of seeds and plants to and from Calcutta.

Propagation.—This was carried on as usual at suitable times throughout the year, and quantities of grafts of all kinds have been made for

members' requirements, which, it is hoped, will be sufficient for all reasonable demands.

Improvements.—Much having already been done under this head, little remains. A commencement has been made towards improving the rose-fields at the south-west end of the gardens. A portion was laid out and new plants put in. The remainder will be undertaken during the next rains.

In addition, the piece of ground, to the east of the Garden Office on which there was a plantation of trees, has been neatly laid out in ornamental beds, and Crotons and Dracaenas of every kind have been planted to be maintained as specimen varieties.

Cannas.—A further lot of hybrids have been produced, many of which are remarkable for the colour and size of their flowers.

Roses.—It is much to be regretted that the imported plants, especially of the Tea varieties, are very delicate, and the climate of Calcutta, particularly during the hot weather, is found to be very detrimental to their growth. The consequence is, that very many plants after a year succumb to the heat, and propagation is not possible.

It seems useless under these conditions to import some of the finest named varieties.

STATEMENT OF RECEIPTS AND EXPENDITURE

RECEIPTS.	Rs. As P	Rs. As. P.
To Cash Account—		
Balance in the Bank of Bengal on 1st January, 1911 .	21 7 4	
Balance in hands of Secretary	91 11 4	
		116 5 8
„ Subscription Account—		
Admission Fees & Subscriptions	.....	11,108 5 0
„ Seed Account—		
Sale proceeds of Native Vegetable and Miscellaneous Seeds ...	1,263 14 0	
Do. Imported & acclimatized ...	5,982 6 0	
		7,246 4 0
„ Printing Account—		
Sale proceeds of Publications	.....	17 0 0
„ Freight Account—		
Sundry freights recovered	.....	1,249 1 9
„ Petty Charges Account—		
Packing and Forwarding charges received	.....	1,673 7 6
„ Suspense Account—		
Amount at credit of sundry parties . .	.....	25 10 0
„ Interest Account—		
Interest on Grant Testimonial Fund . .	95 7 2	
Do. Fixed Deposit .	782 0 0	
		877 7 2
„ Garden Account—		
Sale proceeds of Fruit Trees and Plants . ..	4,872 5 0	
Do. Boxes and Pots	450 12 0	
Packing and Forwarding charges recovered ...	518 6 9	
		5,845 7 9
Carried over . .	.....	28,159 0 10

tural Society of India.

from 1st January to 31st December, 1911.

DISBURSEMENTS.	Rs. As. P.	Rs. As. P.
By Seed Account—		
Remitted to Sutton & Sons ...	3,307 12 6	
Do. Jas. Carter & Co. ...	2,472 14 6	
Do. Law Somner & Co.	97 1 0	
Do. E. Benary ...	84 14 0	
Customs duty on Seeds clearing charges, etc. ...	302 6 6	
Cost of Imported Seeds locally purchased	91 12 0	
Cost of acclimatized Native Vegetable and Miscellaneous Seeds	682 2 9	
		7,038 15 3
„ **Establishment Account—**		
European Establishment from December, 1910, to November, 1911	10,080 0 0	
Native Establishment from December, 1910, to November, 1911	4,208 2 3	
		14,288 2 3
„ **Library Account—**		
Subscription to publications and books purchased ...	.....	52 13 0
„ **Advertisement Account—**		
Advertising Meetings ...	.....	24 0 0
„ **Stationery Account—**		
Cost of sundry Stationery Account Books, etc. ...	.....	54 12 0
„ **Printing Account—**		
Printing Proceedings and Journal	61 14 0	
Do. Miscellaneous Job work	165 14 0	
		227 12 0
Carried over ...	.....	21,686 6 6

Agricultural and Horticul

STATEMENT OF RECEIPTS AND EXPENDITURE

RECEIPTS—contd.	Rs.	As.	P.	Rs.	As.	P.
Brought forward ...	.....			28,159	0	10
To Flower Show Account— Amount received	.....			1,674	0	0
„ **Fixed Deposit Account—** Amount transferred to current account	.....			5,000	0	0
„ **Lawn Tennis Court a/c.—** Amount of Fees received ...	.....			162	0	0
„ **Extraordinary Receipts—** Perpetual annuity from Government of Bengal ...	.....			6,000	0	0
Carried over ...	.....			40,995	0	10

tural Society of India.

from 1st January to 31st December, 1911.

DISBURSEMENTS—contd.	Rs. As. P.		
Brought forward ...	.....		21,686 6 6
By Freight Account—			
Freight prepaid on Plants, Seeds, etc.	.....		1,618 11 3
,, Fee Account—			
Auditor's fee for auditing 1910 accounts	.....		50 0 0
,, Petty Charges Account—			
Postage on Letters, Proceedings and Journal V.-P. Ry. Receipts also Bank charges	236 2 9		
Gharry, cooly and tramhire, wax cloth, punkah cooly, telegrams, etc.	878 15 9		
			1,115 2 6
,, Garden Account—			
Establishment and Pensions ...	7,994 13 3		
Municipal assessments on Garden and House ...	800 4 0		
Cost of Boxes and Pots ...	656 11 3		
Cost of imported Seeds, Plants for propagation, tools, cloth for packing, carriage of plants strings, materials for thatching plant houses, etc.	1,491 10 0		
			10,943 6 6
,, Plant Account—			
Cost of plants purchased ...	.....		195 1 3
,, Interest Account—			
Commission charged by Bank for realising interest on Grant Testimonial Fund ...	1 0 0		
Interest on overdraft ...	35 2 8		
			36 2 8
,, House Repairing Account—			
Amount paid	.....		3 1 0
Carried over ...	.....		35,947 15 8

STATEMENT OF RECEIPTS AND EXPENDITURE

RECEIPTS—concld.	Rs.	As.	P.	Rs.	As.	P.
Brought forward ...	.....			40,995	0	10

TOTAL Rs.		40,995 0 10

from 1st January to 31st December, 1911.

DISBURSEMENTS—concld.	Rs. As. P.	Rs. As. P.
Brought forward ...	.....	35,947 15 8
By Lawn Tennis Court Account—		
Amount spent	.....	508 4 3
„ Flower Show Account—		
Amount spent	.....	2,292 11 0
„ Subscription Account—		
Refund made	.....	37 4 0
„ Cash—		
Amount at credit with Bank of Bengal	2,067 6 10	
Balance in the hand of Secretary	141 7 1	
		2,208 13 11
TOTAL Rs. ...	.....	40,995 0 10

STATEMENT OF RECEIPTS AND EXPENDITURE

DISBURSEMENTS.	Rs.	As.	P.	Rs.	As.	P.
Ordinary Expenditure—						
As per statement	27,317	11	2			
Garden Expenditure—						
As per statement	10,913	6	6			
Plants purchased	495	1	3			
				38,786	2	11
Cash Balance—						
In the Bank	2,067	6	10			
In hand	141	7	1			
				2,208	13	11
TOTAL Rs. ...	.....			40,995	0	10

Examined and found correct.

LOVELOCK & LEWES,
Chartered Accountants.

Calcutta, 20th March, 1912.

tural Society of India.

from 1st January to 31st December, 1911.

RECEIPTS.		Rs.	As.	P.	Rs.	As.	P.
Opening Cash Balance—							
On 1st January, 1911	...	.....			116	5	8
Ordinary Receipts—							
As per statement ...	...	29,033	3	5			
Garden Receipts—							
As per statement ...	...	5,845	7	9			
					34,878	11	2
Perpetual Annuity ...		.....			6,000	0	0
TOTAL Rs.	...	.....			40,995	0	10

BALANCE SHEET

LIABILITIES.	£	s.	d.	Rs.	As.	P.	Rs.	As.	P.
Capital				.....			5,02,431	4	0
Liabilities—									
Sutton & Sons	217	0	0						
Jas. Carter & Co.	121	18	9						
A. Yates & Co., Ld.	7	17	6						
Watson & Scull	5	3	10						
E. Benary	5	2	9						
Haage & Schmidt	2	5	5						
Watkins & Simpson	0	16	1						
Ant. Roozen & Son	0	12	8						
Yokohama Nursery Co., Ld	0	5	5						
F. C. Heineman	0	1	1						
Total	394	3	9	@ 1s. 4d. per Re.			5,912	13	0
Sundry Creditors—									
Office Establishment ...				953	0	0			
Garden do. ...				929	1	9			
Audit Fee				50	0	0			
Miscellaneous Bills ...				1,404	9	9			
							3,336	11	6
Suspense Account ...				.....			25	10	0
Reserve against Outstanding ...				.....			250	0	0
TOTAL Rs. ...				.....			5,11,959	6	6

Examined and found correct.

LOVELOCK & LEWES,
Chartered Accountants.

Calcutta, 20th March, 1912.

as at 31st December, 1911.

ASSETS.			Rs. As. P.	Rs. As. P.
Landed Property—				
Buildings, Plant Houses, etc., at 17, Alipur Road		...	4,54,031 12 0	
Do. do. at 5, Belvedere			35,029 8 0	
				4,89,061 4 0
Outstandings—				
Garden	1909	Rs. As. P. 17 0 0		
Do.	1910	15 12 0		
Do.	1911	1,475 5 0		
			1,508 1 0	
Subscriptions	1909	34 0 0		
Do.	1910	103 4 0		
Do.	1911	396 4 0		
			533 8 0	
				2,041 9 0
Grant Testimonial Fund—				
3½% Government Proms. Notes			2,800 0 0	
Interest accrued on same		..	47 11 7	
				2,847 11 7
Fixed Deposit with Bank of Bengal at 3½% ...		...		15,200 0 0
Cash—				
In the Bank of Bengal		...	2,067 6 10	
In the hands of Secretary		...	141 7 1	
				2,208 13 11
TOTAL Rs.		...	.....	5,11,959 8 6

The Agri.-Horticultural Society of India.

MINUTES of the Ordinary Meeting of the Council of the Agri.-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 15th July, 1911, at 7-30 a.m.

Present:

SHIRLEY TREMEARNE, Esq., *Vice-President, in the Chair.*

GEO. GIRARD, Esq., F.R.H.S.
JOHN DAVENPORT, Esq.
G. B. McNAIR, Esq.
C. W. WALSH, Esq.
BABU AMBICA CHURN LAW.
N. C. SEN, Esq.

F. H. ABBOTT, Esq., *Secretary.*

S. PERCY-LANCASTER, Esq., F.R.H.S., *Asst. Secretary.*

The Minutes of the Ordinary Council Meeting held on the 10th June, 1911, having been already circulated were confirmed.

The following gentlemen were proposed and elected as Ordinary Members :—

Mr. S. B. Robinson; Mr. A. Topping, Managing Agent, Alyn Tea Estate.

MINUTES of the Ordinary Meeting of the Council of the Agri.-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 12th August, 1911, at 7-30 a.m.

Present:

SHIRLEY TREMEARNE, Esq., *Vice-President, in the Chair.*

Geo. GIRARD, Esq., F.R.H.S.	C. W. WALSH, Esq.
JOHN DAVENPORT, Esq.	J. A. SIMPSON, Esq.
F. H. EGGAR, Esq.	E. J. OAKLEY, Esq.
G. H. L. MACKENZIE, Esq.	Babu AMBICA CHURN LAW.

F. H. ABBOTT, Esq., *Secretary.*
S. PERCY-LANCASTER, Esq., F.R.H.S., *Asst. Secretary.*

The Minutes of the Ordinary Council Meeting held on the 15th July, 1911, having been already circulated were confirmed.

The following ladies and gentlemen were proposed and elected as Ordinary Members :—

Miss E. M. Dyson; Mrs. Reginald Curran; Mr. W. S. J. Wilson; Mr. A. J. Pugh.

MINUTES of the Ordinary Meeting of the Council of the Agri.-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 9th September, 1911, at 7-30 a.m.

Present:

GEO. GIRARD, ESQ., F.R.H.S., *Vice-President, in the Chair.*
G. H. L. MACKENZIE, ESQ. | JOHN DAVENPORT, ESQ.
C. W. WALSH, ESQ.

F. H. ABBOTT, ESQ., *Secretary.*
S. PERCY-LANCASTER, ESQ., F.R.H.S., *Asst. Secretary.*

The Minutes of the Ordinary Council Meeting held on the 12th August, 1911, having been already circulated were confirmed.

The following gentlemen were proposed and elected as Ordinary Members :—

J. Paul Chaudhury, Esq.; Babu Joy Narain Chunder,

MINUTES of the Ordinary Meeting of the Council of the Agri.-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 28th October, 1911, at 7-30 a.m.

Present:

THE HON'BLE, THE MAHARAJADHIRAJ BAHADUR OF BURDWAN, K.C.I.E., I.O.M., *President, in the Chair.*

JOHN DAVENPORT, Esq.	G. H. L. MACKENZIE, Esq.
SHIRLEY TREMEARNE, Esq.	C. W. WALSH, Esq.
G. B. McNAIR, Esq.	Babu AMBICA CHURN LAW.

F. H. ABBOTT, Esq., *Secretary.*

S. PERCY-LANCASTER, Esq., F.R.H.S., *Asst. Secretary.*

The Minutes of the Ordinary Council Meeting held on the 9th September, 1911, having been already circulated were confirmed.

The following gentlemen were proposed and elected as Ordinary Members :—

R. W. Hutchison, Esq., Montague Thomas, Esq.

The Secretary, Prince of Wales's Public Garden, Mozufferpore.

CONTRIBUTIONS.

The Philippine Agricultural Review, Vol. IV, Nos. 1, 2, 4, 5, 6, 8, 9, 10. 11 and 12, for the months of January, February, April, May, June and August to December 1911, 10 copies, and Vol. V, Nos. 1 and 2, January and February, 1912. From the Director.

Bulletin of Miscellaneous Information, Royal Botanic Gardens, Kew, Nos. 4, 5, 6, 8 and 10 of 1911, and Appendix IV of 1911; 1 copy No. 1 of 1912; 1 copy and Appendix I of 1912. From the Director.

Revista De Agricultura Organo De la Secretaria De Estado De Agricultural Immigracion Anno VII, Nums. 1 to 8 and 12 of 1911, 9 copies. From the Director.

Agricultural Bulletin of the Straits and Federated Malay States Vol. X, Nos. 3—9, March to September 1911, and 11 and 12 for November and December 1911. From the Director.

The Agricultural Journal of the Union of South Africa, Vol. I, Nos. 4 and 5 for May and June 1912; Vol. II, Nos. 1, 2, 3, 4 and 6, July to October; and No. 6 for December 1911; and Vol. III, Nos. 1 and 2 for January and February 1912. From the Government of South Africa.

Records of the Geological Survey of India, Vol. XL, Part IV of 1910. and Vol. XLI, Parts I, II and III of 1911; Part IV of 1912, 1 copy. From the Government of India.

The Agricultural Journal of India, Vol. V, Part III, of July 1910, 1 copy; Vol. VI, Part II, April 1911, Part III, July 1911, and Part IV, October 1911, 3 copies. Vol. VII, Part I, January 1912, 1 copy. From the Director, Agricultural Research Institute, Pusa.

Memoirs of the Department of Agriculture in India, Vol. III, No. 6, October 1910; Vol. IV, No. 1, January 1911; Vol. II, No. 10, December 1911; and Vol. IV, No. 3, January 1912. From the Director.

The Indian Forester, Vol. XXXVII, Nos. 5 to 8 and 10 to 12, from May to August and October to December 1911. From the Editor.

The Agricultural News, a Fortnightly Review of the Imperial Department of Agriculture for the West Indies, Vol. X, Nos. 235—242 and 244 to 252 of 1911, and Vol. XI, Nos. 254 to 258 of 1912. From the Director.

Report on the Trade carried by Rail and River in Bengal in the official year 1910-11, 1 copy. From the Government of Bengal.

Report of the Agricultural Department, Bengal, for the year ending 30th June, 1911, 1 copy. From the Government of Bengal.

The Trade of Bengal with Nepal, Tibet, Sikkim and Bhutan for the official year ending 31st March, 1911. From the Government of Bengal.

Agricultural Statistics of Bengal for 1909-10, 1 copy. From the Government of Bengal.

Season and Crop Report of Bengal for the year 1910-11, 1 copy. From the Government of Bengal.

Report of the Agricultural Department, Eastern Bengal and Assam, for the year ending 30th June, 1911. From the Government of Eastern Bengal and Assam.

Report of the Civil Veterinary Department, Eastern Bengal and Assam, for the year 1910-11. From the Government of Eastern Bengal and Assam for the year ending the 30th June, 1911.

Report on the Season and Crops of Eastern Bengal and Assam for 1910-11, 1 copy. From the Government of Eastern Bengal and Assam.

Report on the Management of the Provincial and District Gardens of the Central Provinces for the year 1910-11, 1 copy. From the Director.

Report on the Working of the Department of Agriculture of the Central Provinces for the year 1910-11. From the Director.

Report on the Agricultural Stations in the Central Provinces and Berar for the year 1910-11, ending the 30th June 1911, 1 copy. From the Director.

Season and Crop Report of the Central Provinces and Berar for the year 1910-11, 1 copy. From the Director.

Report on the Operations of the Department of Agriculture, Madras Presidency, for the official year 1910-11, 1 copy. From the Director.

Season and Crop Report of the Bombay Presidency for the year 1910-11, 1 copy. From the Director.

Annual Administration Report of the Forest Department of the Madras Presidency for the twelve months ending 30th June 1911, 1 copy. From the Director.

Land Records Administration Report of Burma for the year ending 30th June 1911, 1 copy. From the Director.

Report on the Operations of the Department of Agriculture, Burma, for the year ending 30th June 1911, 1 copy. From the Director.

Report on the Working of the Government Gardens and Parks in Mysore during the year 1909-10, with the

Government Review thereon, 1 copy. From the Government of Mysore.

Annual Administration Report of the Government Botanic Gardens and Parks in the Nilgiris for the year 1910-11, 1 copy. From the Government of Madras.

Report on the Government Horticultural Gardens, Lucknow, for the year ending 31st March 1911, 1 copy. From the Superintendent.

Report on the Government Horticultural Gardens, Lucknow, for the year ending 31st March 1911, 1 copy. From the Superintendent.

Report on the Government Agri.-Horticultural Gardens, Lahore, for the year 1910-11, 1 copy. From the Superintendent.

Annual Report of the Empress and the Bund Gardens, Poona, for the year 1910-11, 1 copy. From the Superintendent.

PRESENTATIONS.

FROM THE CURATOR, BOTANIC GARDENS, DURBAN—

1 packet each.

Calodendron capense.
Ornithogallum Saundersii.
Chlorocodon Whitei.
Ornithogallum thyrsoides.
Bowiea volobulis.
Asparagus falcatus.
Psychotria capensis.
Dracaena Hookeriana.
Tephrosia grandiflora.
Millettia caffra.
Brunsfelsia americana.
Toddalia lanceolata.
Indigofera arrecta.
Turraea obtusifolia.
Carissa acuminata.
Calpurnia lasiogyne.
Bauhinia picta.
Gloriosa virescens.
Oxyanthus natalensis.
Moraea iridioides.
Crotalaria Grantiana.
Strychnos Athersonii.
Littonia modesta.
Tabebuia triphylla.
Carissa grandiflora.
Chrysophyllum viridifolia.
Sphedamnocarpus pruriens.
Strelitzia angusta.

From the Suptdt., Hortic. Gardens, Lucknow,-

1 packet each.

Sapindus emarginatus.
Adansonia digitata.
Caesalpinia bonducella.
Caesalpinia sappan.
Dalbergia sissoo.
Anogeissus pendula.
Bauhinia valhii.

From the Suptdt., Royal Botanic Gardens, Sibpur—

1 packet each.

Shorea robusta.
Malpighia punicæfolia.
Hibiscus abelmoschus.
Cassia glauca.

From the Curator, Botanic Gardens, Pietermaritzburgh, Natal—

1 packet each.

Lagunaria patersonii.
Cupressus Goveniana.
Juniperus excelsa.
Cryptocarya Woodii.
Phytolacca dioica.
Xanthoxylum capense.
Gleditschia inermis.
Gardenia globosa.
Encephalartos caffra.
Cupressus funebris.
Seaforthia elegans.
Cupressus pyramidalis.
Watsonia Ardenii alba.
Watsonia Meriana.

SHORT NOTES AND DESCRIPTIONS OF PLANTS IN THE SOCIETY'S PRICE LISTS.

(Continued from Proceedings and Journal for July-December, 1911.)

ADDITIONAL NOTES FROM MEMBERS IN VARIOUS DISTRICTS WILL BE GLADLY ACCEPTED.

TABEBUIA CHRYSANTHA, vide *Bignonia chrysantha.*

TABERNAEMONTANA (Apocynaceæ) *Tagar—Chandni.* Very useful flowering shrubs, producing masses of pure white single and double *Gardenia*-like flowers all the year round. Propagated by cutting.

TACCA (Taccaceæ). Curious lily-like plants, *laevis* has small insignificant green flowers but *cristata* produces a head of purplish brown ones with thread like appendages on a tall stem. Propagated by cutting.

TALAUMA CANDOLII, vide *Magnolia mutabilis.*

TALAUMA PUMILA, vide *Magnolia pumila.*

TECOMA (Bignoniaceæ) *Trumpet Creeper.* Several varieties are shrubs; one of these, *capensis*, forms a dwarf bush and bears orange scarlet flowers, while *chrysantha*, *mollis* and *stans* are tall shrubs with yellow flowers of different shades, *radicans* and *grandiflora* are creepers which flower during the hot weather and rains, the former has rosy-scarlet and the latter terra-cotta flowers. *Jasminioides* is the prettiest variety, a creeper with pure white flowers and red throat. Propagated by seed and layer.

TECTONA (Verbenaceæ) *grandis. Sagun: Teak.* This tall timber tree is of slow growth and is not at all ornamental; used for roadside planting. Propagated by seeds.

TERMINALIA (Combretaceæ). Tall trees. *Catappa, Desi Badam* or *Country Almond* is a very handsome foliage tree. The kernels are eaten and also furnish an oil. The other varieties give good timber. Propagated by seeds.

THESPESIA (Malvaceæ) *populnea. Paresh.* A quick growing tree with yellow Hibiscus-like flowers. Propagated by seeds.

THEVETIA (Apocynaceæ) *nerifolia-Zaird Kanel.* A common tree found all over India. The sweet-scented yellow flowers are like an Allamanda in general appearance. Propagated by seed.

THUNBERGIA (Acanthaceæ) *Alata* and the several subvarieties are annual creepers and very pretty. *Affinis, erecta, e alba, Kirkii* are handsome flowering shrubs, *fragrans* and *Hawtayneana* are light creepers while *coccinea* and *mysorensis* heavy growing ones, which do not flourish in Calcutta. *Grandiflora* and *Harrisii* are rampant growers and overpower any tree up which they may climb. Propagated by seed and layer.

THUYA (Conifereæ) *orientalis.* A tall evergreen shrub, very handsome. Propagated by seeds.

TILLANDSIA (Bromeliaceæ) *acaulis.* A dwarf pine-apple-like plant with bronze foliage, used in rockeries. Propagated by division.

TITHONIA (Compositeæ) *tagetiflora. Perennial Sunflower.* An untidy growing shrub with large single sunflower-like flowers. Propagated by cuttings.

TOXICOPHLAEA (Acokanthera) (Apocynaceæ) *spectabilis.* Winter sweet. A handsome flowering shrub with white Ixora-like flowers, sweetly scented. Propagated by layers.

TRADESCANTIA (Commelinaceæ). Dwarf succulent plants of creeping habit with handsome foliage. Propagated by cuttings.

TREVESIA (Araliaceæ). Tall ornamental aralia-like plants with handsome fan shaped leaves. Propagated by cuttings.

TROPIS (Urticaceæ) *aspera*. *Scora, the Siamese Paper tree*. A tall shrub, which grows very quickly, the under-surface of the leaf is silvery. Paper is manufactured from the bark. Propagated by cuttings.

TYDAEA (Gesneraceæ). Dwarf Achimines-like plants with handsome foliage and flowers of various colours. Propagated by division.

URANIA *speciosa*, vide *Ravenala madagascariensis*.

UVARIA (Anonaceæ) *odorata*. *Aurea champa*. A heavy growing creeper with pale yellow flowers like the *Artabotrys* but delicately scented. Propagated by layers.

VALLARIS (Apocynaceæ) *Hyneana*. *Ramsay*. A *quick* growing creeper bearing small bunches of greenish white sweet scented flowers. Propagated by layers.

VELLOZIA (Amaryllideæ) *elegans*, flowers pale lilac in bud but white on opening, leaves recurved, like *Yucca* in appearance. Propagated by seed.

VERBENA (Verbenaceæ) *triphylla*. *Sweet scented Verbena*, vide *Aloysia citriodora*.

VICTORIA (Nymphaceæ) *regia*. *Royal Water Lily*. This gigantic water lily needs a big expanse of water and slight shade. The immense leaves measures 7ft. in diameter, and the flowers are pale pink and 12 inches in diameter. Propagated by seeds.

VINCA (Apocynaceæ) *major and rosea. Galpharingi. Old Maid.* A very common shrub which remains in flower all the year round. *Major* has white flowers, the size of an eight anna bit and *rosea*, as the name signifies, pink flowers. Propagated by seeds.

VIOLA (Violariæ) *Violets.* These old favourites are well-known. A light soil and protection during the rains is all that is necessary to grow them to perfection. Propagated by division.

VITEX (Verbenaceæ) *Nishinda.* Dwarf flowering shrubs with small lilac or blue flowers. Propagated by cuttings.

VITIS (Ampelideæ) *quinquefolia.* A handsome foliage creeper. The foliage becomes beautifully tinted in autumn with scarlet and gold shades. Propagated by layers.

WISTARIA (Leguminoseæ) *chinensis.* A very beautiful flowering creeper, which needs the cold to bring it into bloom, though in Ballygunge it has often flowered. The long drooping bunches of purplish blue pea-like flowers are very pretty. Propagated by seed and layers.

WRIGHTIA (Apocynaceæ) *antidysenterica*, vide *Holarrhena antidysenterica.*

Coccinea has deep red fleshy flowers of rather offensive smell. Propagated by seed.

XANTHOCYMUS (Guttifereæ) *Tumul. pictorius. The Assam mangosteen*, a tall handsome foliage tree which produces an abundance of yellow acid fruit. Propagated by seeds.

XANTHOSMA LINDENI, vide *Phyllotænium Lindeni.*

XYLOPHYLLA (Euphorbiaceæ) *augustifolia.* A tall uninteresting shrub with flattened stems and minute flowers which are produced in profusion. Propagated by layers.

YUCCA (Liliaceæ) *Adam's Needle. Gloriosa* produces a massive spike of creamy white flowers, the size of an egg. The leaves are long aloe-like with a sharp needle apex. Propagated by division.

ZEPHYRANTHES (Amaryllideæ). *The flower of the Wind.* Dwarf crocus-like plants which are largely used for edging flower beds. They flower very profusely during the rains and the colour of the flowers range from white, pink, red, yellow, to lilacy white. Caterpillars enjoy the foliage and bulbs and a sharp watch should be kept for these. Propagated by seeds or division.

A NEW FRUIT FROM URUGUAY.

Through the kindness of Major A. T. Gage, Supdt., Royal Botanic Gardens, Sibpur, four trees of Pouteria Suavis were received for planting. These are seemingly of slow growth and are now about five feet high.

EXTRACT FROM BULLETIN OF MISCELLANEOUS INFORMATION No. 9 (1906) XLVIII.

(Pouteria Suavis, Hemsl.)

In July of the present year, Kew received from the Editor of "Il Giardinaggio" (an Italian horticultural journal, published in Turin) leaves, fruit and seeds of a South American tree, asking whether it is known to science. This material was supplemented by a paragraph from "Il Giardinaggio" of which the following is a translation:—

"Mr. E. Frosio, a horticulturist of Paysandu, Uruguay, in a private letter received by the 'Il Giardinaggio,' sends the following interesting note, which we think our readers will like to see:—

"'There is a plant bearing a fruit and having persistent leaves, which is certainly endemic in the islands of the Uruguay river and is so peculiar that nobody has yet been able to classify it. The general appearance of the plant is that of a laurel, with leaves which are green and shining on the upper surface. The fruit is about the size of an apricot, but of the shape of an apple; it is yellow and scarlet when mature and possesses a perfume so delicate that it is equalled in no other fruit. The seed is like a large hazel-nut, but the edible fleshy part of the fruit is small; it has, however, an extremely agreeable taste and possesses such a remarkable digestive property that when the aborigines have over indulged

they eat freely of this before lying down at night and then they sleep 'like a child' and wake up the next morning with a clear head and a wonderful appetite.'"

There is also in the Kew Herbarium a small flowerless branch collected in Uruguay by John Tweedie, of what is apparently the same species. Tweedie sailed up the river Uruguay about the year 1833, and probably botanised in the islands. The following note accompanies the specimen:—"This is called among the natives of the Uruguay aguya. It is one of the most splendid evergreen trees I have met with, and the fruit, resembling a golden knob pear, has a finer scent than the pine-apple. The two fruits sent are bad specimens." These fruits have disappeared, but those sent by the Editor of 'Il Giardinaggio' are pear-shaped.

Steps have been taken to establish this tree at Bordighere, where seeds have been sown in Mr. Garnier's garden. Under cultivation the fleshy part of the fruit may possibly be so increased as to render it acceptable to a circle outside the aborigines of Uruguay.

W. B. HEMSLEY.

Bi-generic hybrids between Cooperia and Zephyranthes produced at the Agri.-Horticultural Society's Gardens, Alipore, Calcutta. By S. Percy Lancaster, F.R.H.S.

In June 1903, my father, the late Mr. Percy Lancaster, obtained a few hybrids between the Genera Cooperia and Zephyranthes and I cannot do better than quote his description of the three varieties produced. Unfortunately these plants have been lost sight of and I have been unable to find any trace of them. He used the name *Coozephyr* to denote the hybrid origin, but the word *Cooperanthes* has been suggested as being more in keeping with Horticultural nomenclature. So I will adopt it.

Rosea.—A strong growing plant, flowerscape 12in. high, flower larger than *Z. robusta*, pale green centre, pale pinky purple above, going off into deeper colour at the edges. *Cooperia Drummondi* ♀ × *Zephyranthes carinata* ♂

Lancastræ.—Similar to the above but much more robust with stout flower stalks: ovary brownish green, centre of flower apple green, yellowish white above, going off into pinkish lilac, flower larger than above. *Cooperia Oberwetti* ♀ × *Zephyranthes robusta* ♂

Sunset.—This flower is a small size of Cooperia, inside copper and yellow, habit of Cooperia. *Cooperia Drummondi* ♀ × *Zephyranthes Andersoni* ♂

After my father's death in 1904, I found these notes in his Bulb note-book, and as I could not discover the plants mentioned, commenced hybridising on my own. In June, 1907, I got two new varieties from my first batch of hybrids.

Bella.—A strong grower, flower stalk like *Z. robusta* on emerging above ground, dull green; flower bud white tinged pink at apex and edges of petals; colour soft rose,

outside of petals deep pink. The flower opens late in the afternoon and is faintly scented like *Cooperia*.
Cooperia Drummondi ♀ × *Zephyranthes robusta* ♂

BLANDA.—A small flower, white flushed pinky purple: base, apple green, flower stalk green, reddish base. The flower closes early the first day, but opens a second day. Seed capsule like *Cooperia*.
Cooperia Oberwetti ♀ × *Zephyranthes Tretiæ* ♂

Owing to force of circumstances I was separated from my work for a few years, and on my return discovered that my seedlings and hybrids had been lost. Nothing daunted I started my experiments once more and up to the present time have obtained the following hybrids:—

ALIPORE BEAUTY.—In foliage like *Zephyranthes robusta*, ¼in. wide with a faint suspicion of bloom on the foliage, flower stalk 12in., base brownish green flower the size of *Z. robusta*, soft lilacy rose overlaid with white from base upwards, back of petals deeper pink, long petals, pistil suppressed, flower upright like Cooperia perianth tube 3in. long.
Cooperia Oberwetti ♀ × *Zephyranthes robusta* ♂

MARY.—In foliage like Cooperia Drummondi, covered with a heavy bloom, ¼in. wide, flower stalk 8in. high, base brownish green. The flower is the size of Cooperia Drummondi, only a delicate flesh pink. Perianth tube 2½in. long, pistil suppressed, flower upright like Cooperia.
Cooperia Drummondi ♀ × *Zephyranthes robusta* ♂

PERCY.—Foliage like Cooperia, ⅛in. wide, with a faint tinge of bloom, flower stalk 8in. base pale red, perianth tube short pale green, ovary green; pistil suppressed, colour pale cream, centre slightly deeper, flower nodding like Zephyranthes.
Zephyranthes citrina ♀ × *Cooperia Drummondi* ♂

SYDNEY.—In foliage like Cooperia Drummondi covered with bloom, ¼in. wide flower stalk 8in. green, base reddish, flower like Cooperia Drummondi, pale sulphur in colour, fading to a creamy white in the sun, but keeping open for a second day. Flower upright-like Cooperia, perianth tube 3½in. long.
Cooperia Drummondi ♀ × *Zephyranthes citrina* ♂

In the Cooperanthes hybrids (Cooperia ♀ × Zephyranthes ♂) Cooperia is dominant over Zephyranthes in foliage, and shape of flower, but the colour of Zephyranthes is in every case modified. *In Zephyranthes* ♀ × *Cooperia* ♂ , Zephyranthes is dominant in colour and shape of flower.

To understand the difference between Cooperia and Zephyranthes, I have noted below the chief distinctions.

Cooperia Drummondi has white primrose-scented flowers, perfectly upright in growth, which open in the afternoon, the foliage is covered with a whitish bloom. The anthers are pressed close round the style below the stigma which is large. The perianth tube is 3in. long. In C. Oberwetti the foliage is narrower than C. Drummondi and has less bloom.

In Zephyranthes the flower tube is short and funnel shaped, nodding, stamens affixed to the throat of the flower. The stigma is distinctly three branched. The flowers of Zephyranthes are of various colours, and the foliage of different widths from 1/16 to ¼in. I should be very pleased to hear from any reader who has tried hybridising these pretty "flowers of wind," to compare results. I have still a few hundreds of hybrid progeny, which will in all probability flower next June, and I expect a good many more Cooperanthes.

THE CULTIVATION OF CAMPHOR.

The following extracts, presenting details of camphor cultivation, are taken from the *Yearbook* of the United States Department of Agriculture, for 1910, p. 452. They refer particularly to conditions in that country; but possess an interest, in the West Indies:—

The camphor tree is hardy where the winter temperature does not fall below 15°F., but even at this temperature some loss of small branches will occur if the tree continues to grow until late in the season and has not become completely dormant before the frost comes. The tree easily adapts itself to new conditions, and can be grown on a wide range of soils; in fact, it can be grown on any soils except on very low land where water stands part of the year. The maximum growth occurs, however, on a rich, well-drained soil.

For commercial cultivation it is probably best to plant on low-priced sandy land, since in this situation the trees do well with less cost for cultivation and a smaller initial cost of land.

PROPAGATION. Camphor can be propagated by seed, cuttings, and root cuttings, but for commercial purposes the first method is to be preferred, except in cases of special varieties having some valuable characteristic which would not be reproduced by the seed. In propagation by seed great care should be taken in the selection of the land for the seed bed. If possible, a rich, well-drained soil which has been under cultivation in previous years should be found. If this is not possible, new land can be used; but in either case land infested with Bermuda grass [Devil's grass—*Cynodon Dactylon*] or maiden cane cannot be used, since the roots of these grasses will take up the moisture in the soil and prevent the germination of the seed.

THE SEED AND SEED BED. Too much emphasis cannot be placed on the preparation of the seed bed, since after the seeds are planted no cultivation can be given for three months.

In size and shape, camphor seed resembles the common wild black cherry, consisting of small stone surrounded by a fleshy pulp covered with a thin black skin.

The seed bed should be prepared before the seeds are gathered, and as soon as secured the berries should be planted fresh

with the pulp left on. For convenience in future handling, the seed should be planted in hills 3½ feet by 1½ feet, with three seeds to the hill, and covered about 2 inches deep. This method will require about 24 quarts of seed per acre and will produce enough trees for setting out 16 acres of field planting.

CULTIVATION. The seeds will begin to come up about three months after planting, but four or five months are often required for a full stand. The percentage of germination is very low, and only about one-half the seeds may be expected to grow. Cultivation should begin as soon as possible, and as soon as a full stand is obtained the plants should be thinned to one in a hill and given a good dressing of high-grade fertilizer.

The first season the plants should make a growth of 12 to 18 inches, with a very large and vigorous root system. The treatment the second year should be the same, and at twenty-six months from planting the plants should be from 2 to 3 feet high and well-branched. At this time they are ready for field setting.

PREPARATION OF LAND FOR PLANTING. The land should be well prepared by deep ploughing early in the fall and again worked just before the trees are set. The trees can be dug with a tree digger, and should be cut back very severely. All leaves and small twigs should be removed and the tree well headed back. The tap root should be cut back to 12 inches, and all the small laterals removed.

The trees should be set at the depth at which they were in the seed bed, and a small basin formed by the soil about them for the reception of water. One application of water should be given when the trees are set and one or two later on, as needed, if the rainfall is scanty. No growth will take place in the roots if dry soil is allowed to remain in contact with them, but too much water will cause the roots to sour and die.—*Agricultural News.*

CANNAS.

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A collection of magnificient varieties in new shades and colours, from Annas 8 to Re. 1 per root.

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Various New Hybrids, Society's Own, surpassing beautiful, at Rs. 1-8 per plant.

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VERY BEAUTIFUL FLOWERING TREES.

javanica, deep rosy pink.
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renigera, salmon & pink.

At 8 annas each.

ROSES.

The finest collection in India—all plants true to name—at prices ranging from Annas 4 to Rs. 5.

HIBISCUS "DAWN OF DAY."
(Hybrid type).

HIBISCUS CARNEO-PLENUS.
(Rosa-sinensis type).

THE

Agri.-Horticultural Society of India.

The Minutes of the Ordinary Meeting of the Council of the Agri-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 13th January, 1912, at 7-30 a.m.

Present:

G. B. McNAIR, Esq., *Vice-President, in the Chair.*

F. G. CLARKE, Esq.
C. W. WALSH, Esq.
N. C. SEN, Esq.
F. H. EGGAR, Esq.
G. H. L. MACKENZIE, Esq.
JOHN DAVENPORT, Esq.
GEO. GIRARD, Esq., F.R.H.S.
HAROLD MARTIN, Esq.
BABU AMBICA CHURN LAW.

F. H. ABBOTT Esq., *Secretary.*
S. PERCY-LANCASTER, Esq., F.R.H.S., *Asst. Secretary.*

The Minutes of the Ordinary Council Meeting held on the 28th October 1911 having been already circulated were confirmed.

The following gentlemen were proposed and elected as ordinary members:—

CAPTAIN JAMES FRASER.
SHAIK MAHBOOB ALY, Esq.
L. W. WORGAN, Esq.
MAJOR R. M. MADDOX, I.M.S.
THE MANAGER, DIMA TEA CO., LD.
THE MANAGER, LASKARPUR TEA CO., LD.

The Minutes of the Annual General Meeting of the Agri-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 17th February, 1912, at 7-30 a.m.

Present:

THE HON'BLE THE MAHARAJ ADHIRAJ BAHADUR OF BURDWAN, K.C.I.E., K.C.S.I., LL.D., F.R.G.S., *President, in the Chair.*

JOHN DAVENPORT, Esq.
G. B. McNAIR, Esq.
F. G. CLARKE, Esq.
HAROLD MARTIN, Esq.
N. C. SEN, Esq.
BABU AMBICA CHURN LAW.

F. H. ABBOTT, Esq., *Secretary.*
S. PERCY-LANCASTER, Esq., F.R.H.S., *Asst. Secretary.*

The election of Officers and Members of the Council for the current year was proceeded with, the result being as follows:—

President:

THE HON'BLE SIR BIJOY CHAND MAHTAB, MAHARAJ ADHIRAJ BAHADUR OF BURDWAN, K.C.I.E., K.C.S.I., LL.M., F.R.G.S.

Vice Presidents:

GEO. GIRARD, Esq., F.R.H.S.
F. G. CLARKE, Esq.
G. B. McNAIR, Esq.
BABU AMBICA CHURN LAW.

Members of Council:

JOHN DAVENPORT, Esq.
C. W. WALSH, Esq.
F. H. EGGAR, Esq.
L. A. SIMPSON, Esq.
G. H. L. MACKENZIE, Esq.
C. HASENBALG, Esq.
HAROLD MARTIN, Esq.
L. D. PETROCOCHINO, Esq.
SIR R. N. MOOKERJEE, C.I.E., K.C.S.I., C.E.
N. C. SEN, Esq.
BABU SARODA CHURN MITTRA.
THE MAHARAJA OF DURBHANGA, K.C.I.E.

The Minutes of the Ordinary Meeting of the Council of the Agri Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 17th February, 1912, at 8 a.m.

Present:

THE HON'BLE THE MAHARAJ ADHIRAJ BAHADUR OF BURDWAN, K.C.I.E., F.C.S.I., F.O.M., F.R.G.S., *President, in the Chair*

JOHN DAVENPORT, Esq.
F. G. CLARKE, Esq.
G. B. McNAIR, Esq.
HAROLD MARTIN, Esq.
N. C. SEN, Esq.
Babu AMBICA CHURN LAW

F. H. ABBOTT, Esq., *Secretary.*
S. PERCY-LANCASTER, Esq., F.R.H.S., *Asst. Secretary.*

The Minutes of the Ordinary Council Meeting held on the 13th January 1912 having been already circulated were confirmed.

The following Lady and Gentleman were proposed and elected as Ordinary Members :—

THE MANAGER, IRINGMARA TEA CO., LD.
MRS. N. R. SANKEY.

The Minutes of the Ordinary Meeting of the Council of the Agri-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 16th March, 1912, at 7-30 a.m.

Present:

THE HON'BLE THE MAHARAJ ADHIRAJ BAHADUR OF BURDWAN, K.C.I.E., K.C.S.I., I.O.M., F.R.G.S., *President in the Chair.*

JOHN DAVENPORT, Esq.
G. B. McNAIR, Esq.
G. H. L. MACKENZIE, Esq
F. H. EGGAR, Esq.
J. A. SIMPSON, Esq.
C. HASENBALG, Esq.
HAROLD MARTIN, Esq.
C. W. WALSH, Esq.
SIR R. N. MOOKERJEE, K.C.I.E.
N. C. SEN, Esq.
BABU AMBICA CHURN LAW.
BABU SARODA CHURN MITTRA.

F. H. ABBOTT, Esq., *Secretary.*
S. PERCY-LANCASTER, Esq., F.E.H.S., *Asst. Secretary.*

The Minutes of the Ordinary Council Meeting held on the 17th February 1912 having been already circulated were confirmed.

The Minutes of the Ordinary Meeting of the Council of the Agri-Horticultural Society of India, held at the Society's Garden, Alipore, on Saturday, the 18th May, 1912, at 7-30 a.m.

Present:

THE HON'BLE THE MAHARAJ ADHIRAJ BAHADUR OF BURDWAN, K.C.I.E., K.C.S.I., I.O.M., F.R.G.S., *President, in the Chair.*

F. G. CLARKE, Esq.
C. HASENBALG, Esq.
G. B. McNAIR, Esq.
HAROLD MARTIN, Esq.
Babu AMBICA CHURN LAW.
Babu SARODA CHURN MITTRA.

F. H. ABBOTT, Esq., *Secretary.*
S. PERCY-LANCASTER, Esq., F.R.H.S., *Asst. Secretary.*

The Minutes of the Ordinary Council Meeting held on the 16th March 1912 having been already circulated were confirmed.

The following gentlemen were proposed and elected as Ordinary Members :—

G. L. SIDEY, Esq.
S. R. DAS, Esq.

CONTRIBUTIONS.

Federated Malay States Government Gazette, Vol. IV. Nos. 1 to 7, 9 to 17, 19, 20, 22 to 30, 32 to 39, 44 to 49, 51 to 53 for 1911-1912. 43 copies. From Government of Malay.

Annual Report on the Botanic Gardens Singapore, for the year 1911. 1 copy. From the Director.

Annual Report of the Department of Agriculture, Bombay Presidency, for the year 1910-11. 1 copy. From the Director.

Statistical Returns with a brief note of the Registration Department in Bengal 1911. 1 copy. From Government of Bengal.

Report on the Maritime Trade of Bengal, for the official year 1911-12. 1 copy. From Government of Bengal.

Agricultural Statistics of Bengal for 1910-11. From Government of Bengal.

Scientific Report of the Hagari Agricultural Station, for 1910-11. 1 copy. From the Director, Department of Agriculture, Madras.

Scientific Report of the Pulur Agricultural Station, for 1910-11. 1 copy. From the Director, Department of Agriculture, Madras.

Scientific Report of the Samalkata Agricultural Station, for 1910-11. 1 copy. From the Director, Department of Agriculture, Madras.

Scientific Report of the Bellary Agricultural Station, for 1910-11. 1 copy. From the Director, Department of Agriculture, Madras.

Scientific Report of the Coimbatore Agricultural Station, for 1910-11. 1 copy. From the Director, Department of Agriculture, Madras.

Scientific Report of the Taliparamba Agricultural Station, for 1910-11. 1 copy. From the Director, Department of Agriculture, Madras.

Scientific Report of the Nandayal Agricultural Station, for 1910-11. 1 copy. From the Director, Department of Agriculture, Madras.

Scientific Report of the Kailpatti Agricultural Station, for 1910-11. 1 copy. From the Director, Department of Agriculture, Madras.

Note on the work of the Burdwan Agricultural Station, for the year 1910-11. 1 copy. From the Government of Bengal.

Annual Report of the Cuttack Agricultural Station, for the year 1910-11. 1 copy. From the Government of Bengal.

Annual Report of the Bankipore, Chinsurah, Dumraon and Kalimpong Agricultural Experiment Stations, for the year 1910-11. 1 copy each. From Government of Bengal.

Memoirs of the Department of Agriculture in India, Vol. III, No. 2, for January 1912. Vol. II, No. 3, February 1912. Vol. IV, No. 4, for March 1912. Vol. IV, No. 5, for April 1912. Vol. II, No. 9, for April 1912. Vol. IV, No. 1, May 1912. 1 copy each. From the Director of Agricultural Research Institute, Pusa.

Bulletin Nos. 40, 41 and 43 to 49 of 1911. 9 copies. From the Director of Department of Agriculture, Bombay.

Records of the Botanical Survey of India. Vol. IV, No. 506 of 1911. 2 copies. From Government of India.

PRESENTATIONS.

From Mr. Seth Apcar, Ballygunge —

Montanoa molissima,
Aralia monstrosa,
Goldfussia isophylla.
Stigmaphyllon ciliatum.

From the Curator, Royal Botanic Gardens, Sibpur-

¼ lb. Shorea robusta.
5 lbs. Sweitenia mahogani.

From W. Hunter, Esq.—

250 Hibiscus cuttings of 30 kinds.

From the Royal Botanic Gardens, Durban—

1 packet seed of each.

Gloriosa virescens.
Psychotria capensis.
Clematis brachiata.
Oxyanthus natalensis.
2 Dracæna Hookeriana.
Osteopermum moniliformis.
Richardia Rehmanni.
Kraussia floribunda.
Ipomea albo-venia.
2 Cassia javanica.
Pavetta obovata.
Toddalia lanceolata.
Marsdenia floribunda.
Tecoma capensis.
Baphia racemosa.
Zanthoxylon Thunbergii.
Bowiea volobulis.
Calodendron capense.
Oncoba Kraussiana.
Littonia modesta.
Turraea obtusifolia.
Croton sylvaticus.
Antidesma venosum.
Gardenia Thunbergii.
Dombeya calantha.
Carissa grandiflora.
Asparagus falcatus.
Dombeya natalensis.

Capparis citrifolia.
Maba natalensis.
Strelitzia augusta.
1 packet unnamed.

INTERESTING REFERENCES.

EEL-WORM.

The Editorial Columns of the Gardener's Chronicle for July 13th, 1912 discuss the damage done by the eel-worm which from all accounts, was originally introduced from the tropics.

The gall-like protuberances on the roots of certain plants combined with a general sickly appearance of the leaves and the premature falling of buds, are familiar to Gardeners as symptoms of the disease.

The following plants suffer most severely from eel-worm though the list of immune plants is unfortunately short.

Amaranthus tricolor.
Musa. (Plantain).
Antirrhinum.
Carnation.
Chrysanthemum.
Centaurea. (Corn flower).
Deutzia crenata.
Gardenia jasminoides.
Hibiscus subdarrifera.
Hibiscus rosa-sinensis.
Hollyhock.
Ipomea purpurea.
Lobelia erinus.
Passiflora.
Pœony.
Petunia.
Sweet Pea.
Stock.
Nicotiana.
Thunbergia fragrans.
Tuberose.
Violet and Yellow Lupin.

Fruit Trees.

Cherry.
Elm.
Fig.
Grape.
Peach.

Vegetables.

Beet
Salsify.
Carrot.
Celery.
Cucumber.
Egg plant.
Endive.
Lentils.
Lettuce.
Melon.
Potato.
Tomato.

Red and white clover, Rape and Bitter Vetch are also susceptible.

To get rid of eel-worm is very difficult, clean cultivation is absolutely necessary as weeds often act as "nurse plants" for the worm.

The very minute dimensions of the larva, which by the way hatches from an egg and is $\frac{1}{30}$ of an inch when full grown, are only revealed by microscopic examination at the earlier stages of the disease. Later the root growth is excessively stimulated, gall-like protuberances being discovered on it, while the foliage also presents a shivelled or wilted appearance. According to recent plant research into the life history of this pest it has been found that the worm takes up its position on the root just beyond the growing portion of the root near the cells which transfer the food substance to the plant. At this point it absorbs all the nourishment it and its ever increasing family need, to the detriment of the plant.

Only 20—30 days is required for a new generation and this accounts for the rapid spread of the eel-worm while cuttings and the planting out of diseased stock is a sure way of disseminating the disease.

Potash manure is known to have a detrimental effect on the worm but to thoroughly exterminate it, the soil should be sterilised by exposure or heat, keeping the land fallow for a couple of years where possible. The use of chemical insecticides is recommended.

Carbon bisulphide is favoured by French cultivators in spite of its expensiveness, but great difficulty is experienced in bringing the gas into direct contact with the soil containing the eel-worms, which exist several feet below the surface of the ground.

One part of Commercial Formalin (Formaldehyde) in 100 parts of water applied at the rate of 1—1½ gallons per square yard of shallow soil is claimed to give the best results and the Society is now trying this method of destroying the eel-worms which have attacked their Hibiscus.

HUMUS.

EVERY gardener knows that humus is formed by the decay of animal and vegetable matter, the most familiar forms in which it is seen being the well-rotted heap of leaf-mould and the remains of the old hot-bed, which are such valuable ingredients of potting composts. The difference between the top layer of black garden soil—1, 2, or 3 feet thick as the case may be—and the lighter-coloured subsoil is almost entirely due to the quantity of humus present in the former and its comparative absence from the latter. Anyone can observe this dark layer of soil in gradual process of formation during a number of years in the case of a heap of soil resulting from the sinking of a well or the making of a railway embankment or cutting. The gravel, clay, chalk, or whatever it may consist of, becomes covered with grass and weeds, the decaying residues of which cause the surface soil to become permeated with veins of dark mould. The latter is composed of minute particles of humus, and these increase year by year until, in the course of time, there appears a thin layer of dark soil, and a layer of partially-ameliorated soil below that, resting upon the original light-coloured soil. The function of humus and the maintenance of an adequate supply of it are of such importance that it will be best to deal with the subject under three heads: physical, chemical and biological, and first we will deal with the

PHYSICAL PROPERTIES

of humus. It is the lightest constituent of the soil, a cubic foot of the pure, dry material weighing less than one-quarter of the same quantity of sand. It is spongy in texture, and is capable of absorbing two or three times its own weight of water, while sand can only hold about one-quarter of its weight of water, in consequence of which properties humus not only keeps heavy soil open, but enables light soils to hold more water. Thus it facili-

tates the access of air to the roots of plants in heavy soils, while the fermentation of the humus helps to warm the soil, in addition to which its darkening of the colour of soils enables them to absorb more of the sun's heat. This latter effect accounts for the fact that Corn sown in the early spring comes up more quickly on a dark soil—other things being equal—than on lighter soils. In addition to all this, a good proportion of humus in a clay soil, by facilitating the passage of water through it, lessens the amount evaporated from the surface, the latter being a process which, as everyone knows, absorbs a vast amount of heat, and thus keeps the soil cold. Another great quality of humus, perhaps the greatest, is that it serves as a store of plant-food in the soil, and this brings us to its

Chemical Activities.

Humus, like all organic matter, is gradually undergoing decay and being broken up into its original elements. Amongst the products of its decomposition are various organic acids, the presence of which in quantity restricts the further breaking up of its substance, and may stop it altogether, as in the case of peat. When we apply lime or chalk to a rich garden soil it neutralises these acids and accelerates the breaking down of the humus, thus setting free stores of plant-food. The stock of humus may in this way be rapidly diminished if it is not kept up by the application of animal manures or other organic substances. Farmers in the Fen country find that the application of lime or basic slag to the sour peats promotes such a rapid breaking down of the peat that its thickness above the underlying clay gets appreciably less in the course of a few years. As humus contains all the elements of plant-food, its decomposition sets them free for the use of plant life. Moreover, the acids produced attack the minute particles of soil and set free a further store of potash and phosphate.

The operations above described, however, are not wholly chemical, but of a

BIOLOGICAL NATURE,

the breaking down of the humus being itself brought about, as we have most of us learned in comparatively recent years, by myriads of soil organisms. We can only just touch upon this large subject here. Though some of these microbes can do their work without air, it is generally held that those which need oxygen for their vital processes are the most beneficial. Some break down organic matter into humus, others break up humus into ammonia, &c., while others convert ammonia by two stages into nitrates which serve for the direct feeding of plants. The important thing to remember is that the acids produced in the early stages of humus decomposition act as poisons and arrest the vital processes, both of the roots of plants and of the beneficent soil-bacteria. So one of the things we have to do is to keep the soil sweet by aëration and the supply of lime when it is deficient. It is only during the present generation that we have seen the full reason for the benefit of the tillage our ancestors have practised for ages.

Thus lime is removed in large quantities from a soil which is rich in humus, as anyone can test for himself by the hardness of the water draining from such a soil. The breaking down of the humus and the formation of nitrate go on very rapidly in hot weather, especially if the soil is damp; hence the luxuriant growth of weeds in late summer, when the soil is still warm from the accumulation of the summer's heat, and often damp. If there is no crop on the soil, much of the nitrates may be washed out before the spring comes, and it therefore behoves the gardener to have something growing on the soil during August and September to absorb the plant-food waiting for them, even if it is only Mustard, to be afterwards dug in to increase the store of humus and thereby supply the needs of the

soil microbes. The amount of humus present in a soil is not only a measure of its fertility, but it is a great factor in retaining artificial manures in the soil. *Alger Petts.*

The Gardeners' Chronicle.

LITCHI LEAF CURL OR RUST.

Almost every year the Society receives numerous letters regarding this disease and in several cases infested foliage has also been sent for indentification.

The leaves, of the tree attacked, become covered with a brownish velvety growth and curl into cylinders or look deformed while in a short time a vigorous tree is a mass of infested branches, the blight spreading usually upwards.

This leaf curl is caused by mites of infinitesimal size, which live among the hairs of the velvety growth and with the coming of the hot weather multiply rapidly attacking the young leaves which are newly formed. By June they reach their maximum development but the increase of the mites is only stopped in November by the advent of the cold weather. They now lie dormant till the following March when they recommence their operations.

From an article appearing in the Agricultural Journal of India Vol. VII, Part 3, by C. S. Misra, B.A., we quote the following effectual method of treating infested trees.

"The best time for treating the trees is the beginning of winter when the trees are dormant and the mites are torpid with cold. But if that time has already passed it is advisable to adopt the following measures after the crop has been gathered in May.

I. Remove all the branches bearing malformed leaves and burn them. In doing so it is essential that the leaves should not be shaken too much or else the mites will fall down on the ground and will again go up the trees.

II. Remove all the fallen leaves below infested trees and burn them. If burning be unpracticable, these should be buried in pits and the covering earth thoroughly rammed down.

III. Put either a ring of coal-tar on the stems or dip a long strip of waste cloth in crude oil emulsion and wrap it round the stem.

IV. Spray the trees with crude oil emulsion and flowers of sulphur.

V. Spray the trees once again by the middle of November when the mites are retiring for the winter and before the trees have put forth tender shoots for the season.

At Pusa very good results have been obtained by first removing the infested leaves and branches and then spraying the trees thoroughly with crude oil emulsion and flowers of sulphur. The mite was considerably reduced and the sprayed trees bore fruit well.

To spray take 1 pint (10 chhitaks) of crude oil emulsion, 4 ozs. (2 chhitaks) of flowers of sulphur and 4 gallons (40 lbs. or 20 srs. or a kerosene-tin full) of water. The sulphur should first be mixed with ½ pint (5 chhitaks) of emulsion by hand, adding a small quantity of water, if required, to make a thick paste; water should then be slowly added and the whole brought up to 4 gallons—briskly churning all the while either with a hand force-pump or a knapsack-sprayer. The spray-fluid when thoroughly emulsified is then to be put on the trees with a knapsack-sprayer, taking care that the underside of leaves is thoroughly wetted and that no part of the tree is left unsprayed. If a few trees in a garden are to be sprayed the knapsack-sprayers will be found both efficient and economical; but where a large number of trees are to be dealt with a spray-pump mounted on a cart will be found the most serviceable. The trees should, as far as possible, be sprayed in the after-

noon, and only a light dose must be applied at first (*i.e.*, 1 pint crude oil emulsion, 2 ozs. flowers of sulphur and 4 gallons of water). If, however, this does not remove all the mites, the quantity of sulphur must be doubled, using 1 pint of emulsion, 4 ozs. flowers of sulphur with 4 gallons of water. The sulphur must be thoroughly incorporated with the emulsion by hand, or else it will float on the surface of the spray-fluid. Roll-sulphur, even if ground and sifted very fine, does not serve the purpose as it soon clogs the nozzles of the spraying machines and is not uniformly distributed. To secure satisfactory results flowers of sulphur must be used; this is obtainable from any of the chemists in large towns. In the Mofussil, if crude oil emulsion cannot be obtained, kerosene emulsion prepared as follows should be used instead :—

Boil half a pound (4 chhitaks) of sliced Bar-soap in a gallon (5 srs.) of water till dissolved. Take off the fire and add 2 gallons (10 srs.) of kerosene, agitating or beating the mixture till the kerosene is completely emulsified. This is the stock solution. When required for use it is to be mixed with sulphur and used as above. If, however, it be impossible to prepare the kerosene-emulsion, good results will be obtained by spraying the trees with Soft-soap and flowers of sulphur.

Soft soap	...	...	... 20 lbs.
Sulphur	...	...	... 2 lbs.
Water	...	...	... 60 gallons.

The soap should first be dissolved in 4 gallons of boiling water. The sulphur is then made into a thick paste with water and added to the former, and water added to bring up the whole to 60 gallons.

For calculating the cost of spraying a tree, a row of 7 trees eight to ten years old was separately sprayed with crude oil emulsion and flowers of sulphur. The height of

the trees varied from 7 ft. 10 in. to 13 ft. 4 in., and the circumference of the stems varied from 3 ft. to 5 ft. 4 in.

		Rs. a. p.
Number of trees	7.	
Crude oil emulsion 3 pints @ Rs. 6-8 per 40 pints		
Two coolies @ As 5 each per day - half day		

(Some spray-fluid was left over; and the coolies finished the work in nearly three hours, but for purposes of calculation half a day's wages have been charged for.)

Thus, it will be seen that the cost of spraying a tree comes up to an anna and a half, and this is not much, considering the value of the tree and the crop obtained from it annually. By spraying, not only is the mite checked, but the trees improve in appearance and bear well."

HIBISCUS.

S. PERCY-LANCASTER, F.R.H.S.

These pretty flowering shrubs are great favorites in Indian Gardens, though some of the older varieties need little introduction, such as rosa-sinensis, rosa-malabarica, liliflorus, rubro-plenus and minatus semi-plenus which are used chiefly for Poojah purposes by the Hindus.

Unfortunately the flower of the Hibiscus fades quickly and can therefore only be used for breakfast table decorations, this debars it from holding a place amongst shrubs which supply cut-flowers.

For Garden or lawn decoration the plants are unsurpassed being hardy and needing little or no special treatment, though fine dust bone meal is always acceptable as manure. With a little judicious pruning and care the Hibiscus can be kept in flower all the year round and certainly repays the Gardener in the abundance of its blooms.

Pruning should be performed when the plant has very few buds appearing and is about to stop flowering for a time, but being strong and quick growers little harm will be done if pruning takes place at any time.

Many Gardeners recommend disbudding so as to get large individual flowers, this practice however is seldom followed. Others again suggest that standards or plants grown on a single stem with a mass of foliage three feet or so from the ground, are the correct mode of growing Hibiscus. The natural bush however is prefered, kept within bounds with branches trimmed to prevent over crowding of growth.

The foliage of the rosa-sinensis type of flower—single and double, scarlet, orange, yellow, etc., is naturally weak therefore very liable to become diseased. This type is frequently attacked by insects, but seldom have one of the hybrid varieties, which have crisp thick leaves, been found either crinkled with eel-worm or wilted through insect bite.

One of the chief enemies of Hibiscus is the eel-worm which causes great damage to the plants. An article dealing with this pest appears in this Journal.

As before noted, the hybrid varieties of Hibiscus appear to be eel-worm proof, and even when grown in affected soil side by side with diseased plants they have shewn no signs of succumbing to the pest.

Another formidable enemy to Hibiscus is a small black beetle with a proboscis. These insects appear annually in June and July and as they usually confine their operations to the hours between sunset and sunrise, can be trapped on the plant ; should one inadvertently touch the branch on which they cling, the beetles will fall and sham death. The insects should be killed to prevent damage as they pierce all the new shoots an inch or so from the top, leaving the damaged portion to shivel and look unsightly. Though

the insect may not kill the Hibiscus outright, it frequently destroys every leaf and the growth of the plant is checked for a considerable time.

Scale insects, stem-borers, cater-pillars and the usual run of Indian Garden pests also attack the Hibiscus but not to a very great extent. A syringing with Nicotine or Kerosene oil Emulsion will be sufficient to remedy the evil.

Hibiscus flowers range through so many shades of colour that they baffle description—scarlet, pink, purple, white, yellow from canary to deep orange, and cerise in a variety of tints.

Before touching on the Hybrid Hibiscus, I append a short description of the other varieties in the Society's collection.

abelmoschos—Musk Mallow. (Kusturi). A tall growing annual variety with drooping flowers, yellow with a purplish centre. The seeds are used as a substitute for Musk while the fibre occupies a high place among those of the jute type. An annual variety.

albo-variegatus (*rosa-sinensis zebrina*). A dwarf growing bush with semi-double flowers, the narrow petals in the centre are white irregularly striped and flaked with scarlet.

Archeri (*liliflorus* X *schizopetalus*). This resembles *liliflorus* in growth and shape of flower but is a paler shade of colour.

Aurora. A lovely soft salmony pink variety with double semi-drooping flowers, dwarf habit and crisp foliage.

Banscroftianus (*Macleayneanus*). A tall stiff grower, with small tubular flowers, white reticulated with pink.

Cameroni has rosy carmine flowers, with a deeper centre, spreading growth and heavy crisp foliage.

chrysanthus. Foliage similar to the above but the flower of a deep yellow shade flamed from base upwards with orange, centre dark maroon, foliage crisp.

Caistro (?). This is a tall variety almost identical with *tillaceus* but taller and with larger drooping flowers. Colour deep yellow with a dark maroon centre, leaves heart shaped.

Calleri. Buff yellow with a carmine base, a quadruple form of *venustus*, flowers very heavy, lasting well.

carneo-plenus, I. This is a pale flesh coloured variety puce centre and deep pink veinings, semi-double form.

carneo-plenus, II is a salmon shade of the above with a dark centre, foliage stiff and shiny.

carneo-plenissimus (*Sport from Calleri*). A quadruple salmon identical with *Calleri* in shape and size but salmon in colour with a dark centre.

Collinus is a tall growing shrub with handsome foliage which assumes autumn tints and is covered with short hairs. The flowers are white or pale rose with a dark carmine centre. Another variety of *Collinus* has smooth leaves but this has not flowered yet.

Cooperi (*rosa-sinensis variegatus*). This is merely a type of *rosa-sinensis* and has flowers identically the same, though never produced fully developed. The foliage is marbled with white and pale carmine.

cruentus (?), has semi-double blood-red flowers like *minatus semi-plenus* only larger.

coccineus (*speciosus*). This variety grows about 3′ high and bears 7—10 flowers, each being 6′—7′ across, deep glossy scarlet—the petals being narrow at the base and club shaped above. The plant dies down shortly after flowering and make its appearance again in May. The stem is reddish and the leaves are reddish green.

ecru. A lovely shade of biscuit yellow, with a white centre.

grandiflorus (?) vide *liliflorus*.

hirtus. A very dwarf *Hibiscus* with small Mallow like flowers, the size of an eight anna bit, and borne in great profusion all the year round, a hedge of this variety is very striking.

Hugelii quinquevulnerus. One of the prettiest varieties—a deep rosy scarlet of very expanded form with petals recurved and edges crinkled. The base of each petal has a large maroon blotch and a white zone above. The flower has a graceful droop and is poised on a long stem while the style or column, which is exceptionally long, gives the flower an unique appearance.

Juno. This Hibiscus and the one succeeding it, were unnamed varieties sent to the Society. The flowers and growth are identical with *Aurora* but brilliant cerise in colour.

Jupiter A single flowered variety, very large and a handsome shade of carmine, the growth and foliage robust.

Lamberti. A quadruple scarlet, smaller than *rubro-plenus* but having a glistening colour; the distinctive mark of this flower lies in the red and white trumpet-shaped petal in the centre of the flower.

limbata is also a scarlet double though larger than the above, resembling a *rubro-plenus* cut exactly in half.

Lucien Linden, forms a tight little mass of crimson scarlet the size of a Tennis ball, growth like *Lamberti*.

luteo-plenus. A semi-double form of ecru, pale biscuit in colour.

luteo-plenus variety, is slightly more double than the preceeding.

liliflorus. This is a tall climbing variety with vermillion scarlet drooping flowers. The petals bend back consider-

ably and are slightly waved, the edges being cut. The flower as the name implies looks like a scarlet lily.

Manihot. Flowers sulphur yellow, purple centre very large but of drooping habit, leaves almost one foot long divided into 5—7 lobes. This is an Annual variety and grows from seed; the flowers borne during the rains measure 6 inches across.

minatus semi-plenus (*sport from albo-variegatus*). A crimson semi-double with a dark centre.

mutabilis. This variety grows into a large bush 12'—16' high and has single pink flowers with dark centre which fade to a deeper shade.

m-albus has single white flowers with a pink centre, which change to a rose colour and then deepen to a dark pink.

m-flore pleno albo is the white double and *m-flore pleno roseo* the double pink.

rosa malabarica has very fine pure scarlet flowers with a darker centre—this, though common, is a lovely variety, the flowers open well and are large.

rosa-sinensis (the Shoe flower), Deep pink with a dark centre, also a common variety.

r.s. brilliantissimus (*magnificus*) has large rosy majenta flowers with very large deep chocolate blotches at the base of each petal.

r.s. kermesinus has been described as having rosy carmine flowers but there is not much difference between this and the preceeding variety.

r.s. quinquevulnerus (*Sport from albo variegatus*). This flower is much paler than the Hugelii variety, and the white zone is missing, while the maroon spots are also smaller.

r.s. zebrinus vide *albo variegatus.*

r.s. intermedius (*r.s. magnificus* X *schizopetalus*). A semi nodding, pale vermillion variety. Petals slightly recurved, edges curled and wavy. This does not climb but grows very tall.

rubro-plenus. This is a quadruple form of *H. quinque vulnerus* it seems, the plant forms a pretty bush and is covered with large scarlet flowers.

schizopetalus. Another climbing variety with pretty Fuschia-like, drooping orange scarlet flowers, the style is very long and the petals, which are deeply laciniated, turn backwards.

syriacus (*Althea frutex*). The Rose of Sharon. This is a purplish variety which is found in most hill stations, centre deep maroon, leaves wedge shaped.

syr. plenus. A very double form of the above.

syr. albo-plenus. A double white.

syr. lilacino-plenus. A double lilac pink.

There are several other varieties of this but *syriacus* single and double white with puce centres are the best I have seen, besides those described above.

tillaceus. The flowers of this Hibiscus are deep yellow, with a maroon centre, drooping. The leaves are heart shaped and the fibre from the stem used for rope, etc. The plant forms a small tree or bush and is found along sea coast, forest and tidal rivers in India, Ceylon and Burma.

tillaceus var. torulosus grows into a medium sized tree and has flowers of a deep brick red.

venustus. A biscuit-yellow like *ecru* with a maroon centre, very pretty.

salmoneus. A pale yellow flushed with salmon, with crisp foliage. This has sported to a white, shaded pink but on being separated it reverted.

subdarrifera. The Rozelle, Patwa, Indian Sorrel. A tall, straight growing annual Hibiscus which flowers in the rains. The fibre is very strong and is used for twine, etc. while the calyx is pleasantly acid and made into jelly and tart. There are two varieties, one with yellow flowers with a large crimson centre and the other dull red with deeper centre. The seeds are sown in May and fruit gathered in November and December.

lampas. A deciduous variety which grows 3—4 feet high with 3 lobed leaves. The flowers are drooping, yellow with a dark crimson centre.

calycinus forms a dwarf bushy shrub 2'—3' high, and bears deep yellow, semi-drooping flowers, with a dark maroon centre.

HYBRID HIBISCUS.

In 1904 I noticed that an old plant of Hibiscus Cameroni behind our office, had a number of empty seed pods on it. This variety has rather medium sized flowers of a carmine pink shade, with a slightly deeper centre and the foliage is crisp, a simple oblong acute in outline.

I had made several attempts at hybridising other varieties of Hibiscus previously but had never succeeded in getting a seed pod to set, so taking advantage of this opportunity I fertilised Cameroni with the pollen of most of the varieties of the rosa sinensis type, double and single, as well as the syriacus, purple and white. Many of the seed pods fell off and several contained unfertile seed, but a large number of seed were sown and germinated in about 6 months. In 1907, 15 flowered and the following are a short description of the first hybrids; as no careful record of each individual cross was kept only the *probable* parentage is given.

President (*Cameroni* X *carneo-plenus*). A lovely deep orange with deep chocolate eye, rather trumpet shaped but with nicely rounded petals.

King-Emperor (*Cameroni* X *rosa sinensis*). A magnificent flower, 6"—6½" across, of very flat formation—petals broad and rounded, deep rosy pink with large maroon eye. Hybrids from this variety have given the Dreadnaught class of flower.

Star of Alipur (*Cameroni* X *carneo-plenus*). Petals long and narrow, very open and a profuse flowerer, pale orange with chocolate eye, and a lilacy zone above centre.

Beauty (*Cameroni* X *rosa-sinensis*). Carmine pink, centre dark carmine, column white, flower star shaped, small.

Belvedere (*Cameroni* X *lili-florus*). Deep cherry red, base slightly deeper, long flower stalk, semi-nodding.

The Commander-in-Chief (*Cameroni* X *rosa-malabarica*). Clear scarlet, medium sized flower, centre deep scarlet.

Exquisite (*Cameroni* X *liliflorus*). Clear carmine, petals rounded, a large flower: the growth is semi scandent and the plant forms a ragged bush.

Garden Beauty (*Cameroni* X *syr. albo. pl.*). Delicate rosy carmine, centre slightly deeper.

Lieutenant-Governor (*Cameroni* X *liliflorus*). Bright cherry red.

The Viceroy (*Cameroni* X *rosa-sinensis*). The flower is almost identical with Cameroni, of a deeper colour—but borne in great profusion.

The Vicereine (*Cameroni* X *syriacus albo-plenus*). Delicate flesh pink fading to white with a deep carmine eye, a small flower.

Sunrise (*Cameroni* X *carneo-plenus II*). Deep reddish orange, a lovely glowing shade, flowers of medium size.

Sunset (*Cameroni* X *rosa-malabarica*). Deep orange scarlet with scarlet base, good sized flower.

Dawn of Day (*Cameroni* X *syr. albo.-pl.*). Soft clear rosy carmine, centre slightly deeper, petals nicely rounded, a good flower.

Evening Star (*Cameroni* X *Ecru*). Deep chrome yellow, base deep carmine, occasionally flushed pink, small.

The Bride (*Cameroni* X *rosa-sinensis*). Very like the Viceroy only a much paler shade, veins white.

These hybrids all exhibited the crisp foliage of Cameroni, though the shape varied, the majority having vine shaped leaves.

Early in 1908, hybrid seed from King-Emperor, President, and a few of the other good varieties fertilised by the pollen of hybrid kinds and rosa-sinensis, was sown and the seedlings resulting from this second generation were planted out in 1910. They were heavily manured with bone meal and commenced flowering in 1911; all the small flowered varieties and any showing a similarity of colour were destroyed, the best only being retained. This was done owing to lack of space, for according to Mendel's theory, seedlings from many of the small kinds would have given good results.

The following are the best of the Dreadnaught type, hybrids from King-Emperor.

Sir Henry Eggar (*K. E.* X *President*). Deep orange, very open flower, eye dark chocolate.

Percy Lancaster (*K. E.* X *President*). Deep terra-cotta shaded orange, eye dark chocolate.

Queen Mary (*K. E.* X *syriacus albo-plenus*). Very pale pink, centre deep pink.

Dreadnaught (*K. E.* X *rosa-sinensis*). Deep rosy pink, very delicate petals, centre slightly deeper.

Amethyst (*K. E.* X *syriacus*). Pink overlaid lilac, an unique combination.

Mamie (*K. E.* X *salmoneus*). Pale canary, flushed salmon pink, centre deep pink.

Perfection (*K. E.* X *mutabilis*). A soft rosy pink, centre pale chocolate, edges crimped and waved, a very lovely flower.

King George V. (*K. E.* X *Star of Alipore*). Orange yellow, base carmine, with a lilac zone above, flower blotched and reticulated pale vermillion.

Aurora Borealis (*K. E.* X *Dawn of Day*). Pale pink, deep carmine centre, with a broad white zone above.

F. H. Abbott (*K. E.* X *rosa-sinensis*). Soft rose pink, darker at tips of petals, base very large, deep maroon, veins deeper.

Harbour Light (*K. E.* X *Evening Star*). Deep chrome yellow, centre maroon, a very large flower.

Lieut.-Col. Prain (*K. E.* X *Star of Alipore*). Orange vermillion shaded terra-cotta, flower star shaped, centre deep carmine.

Sir David Cruickshank (*K. E.* X *brilliantissimus*). Rosy scarlet, base dark carmine.

Sir George Thistleton Dyer, (*K. E.* X *President*). Deep rosy orange on yellow ground, centre carmine, veins and edges of petal yellow.

Lord Kitchener (*K. E.* X *President*). Pale terra cotta overlaid orange and yellow, centre maroon.

Queen Alexandra (*K. E.* X *The Bride*). Pale pink with dark chocolate centre.

The smaller sized varieties are more numerous and contain some very good colours.

Sweetheart, Star of Allipore X *syr. albo-plenus*). White base deep pink, veins pink; very prolific.

Black Knight (*Cameroni* X *brilliantissimus*). A very deep scarlet of a glowing shade, centre slightly deeper.

Golden Crown (*Evening Star* X *President*). Deep yellow, base deep carmine, veins pale orange.

Cleopatra (*Evening Star* X *President*). Rich glowing apricot, base maroon.

Drab. Dull creamy pink, shaded lilac.

Pat (*Sunset* X *Viceroy*). Deep orange scarlet, heavy growth.

Blush. Very pale rose, dark maroon base.

North Pale. Deep scarlet, centre deeper, veins white.

Day-dream (*King-Emperor* X *Vicereine*). Strawberry pink, flushed yellow, deep carmine centre.

Sulphur Queen (*Evening Star* X *syr. albo-pl.*). Pale sulphur yellow, centre very small carmine dot.

Opal (*King-Emperor* X *syriacus*). Half the petals bright carmine and half lilac, centre deep maroon.

Prince of Wales. Vermillon scarlet, no centre.

Copperhead. Rich terra cotta with chocolate centre and a zone of lilac.

Excelsior (*President* X *liliflorus*). Golden orange, very deep carmine base, a climbing variety.

Besides the hybrid Hibiscus referred to in the preceeding notes which amount to over 175 distinct shades, a few extraordinary combinations were made.

Hibiscus mutabilis. The single pink variety was fertilised with the pollen of *King-Emperor* and gave one distinct variety which has been named *Perfection*.

This is a very pale salmony pink, centre deep chocolate, column white and edges of petals crimped and waved.

Among the 25 seedlings from the reverse hybrid of *King-Emperor* and other varieties with *mutabilis*, three have flowered, one being pale pink with no dark centre as in *mutabilis*. The flowers and growth of all are like *mutabilis*.

The Patwa, Indian Sorrel, Rozelle, Hibiscus subdarrifera, has two varieties yellow and red—both having deep scarlet centre and veins of the same colour ramifying outwards. Several yellow, orange and red Hibiscus were fertilised with pollen of the yellow Sorrel and most of the seedlings resulting, show the influence of the pollen parent in the veinings. Major A. T. Gage is the best, deep yellow with scarlet centre and veins of the same colour ramifying toward the edges, while the flower opens very nicely.

Hibiscus syriacus (*Althea frutex*) *and albo-plenus*, have played a large part in the hybrids, the former giving the lilac shades in *Amethyst, Opal and Violet Queen* while *alboplenus* has produced *Bridesmaid and Sweetheart* helping also to tone down yellow and pink varieties. The reverse hybrids have always failed to set to seed.

Hibiscus calycinus a dwarf shrub has small deep yellow semi-drooping flowers with dark maroon centres, like the common yellow Abutilon or Cotton, was crossed with a hybrid Hibiscus. Only one seedling has shewn the influence of the *calycinus*, this being a small yellow flowered variety with leaves covered with small hairs and slightly rough. The plant looks delicate.

The reverse hybrid has produced one plant which has not yet flowered.

Before closing this short sketch I might add that though double varieties were used as pollen parents not a single hybrid has given even a semi-double flower. The colour, however, has been transmitted in the majority of

cases showing that the pollen has actually had effect. According to Mendel's theory the double should appear in the 2nd generation but even in the third I have not succeeded. It may be that the doubles were delicate and failed to germinate or damped off. Moreover I have found that the crisp foliage of the Cameroni type is dominant in every generation and though the shapes vary considerably the texture remains unaltered.

In all over 500 seedlings have been watched from time to time and though only 175 have been selected so far there are many which have not flowered yet.

The usual oblong lanceolate leaf and the seed pod of the Hibiscus vary a good bit in shape. The capsule of Star of Alipore terminates in a sharp point and is rather thin, while that of King-Emperor is twice as big and has a blunt apex. The other kinds have more or less a rounded apex.

The photographs of the Hibiscus appearing as our frontispiece were very kindly lent by Mr. John Davenport of Queens Park, Ballygunge. "Dawn of Day" shews the general bold appearance of the Hybrid Hibiscus.

Melocanna. Bambusoides

(Bambusa. Baccifera)

THE

Agri.-Horticultural Society of India.

Minutes of the Ordinary Monthly Meeting of the Council of the Agri-Horticultural Society of India, held on Friday the 22nd August 1913, at the Society's Gardens, Alipore, at 7-30 a.m.

Present:

GEO. GIRARD, Esq., F.R.H.S., I.S.O., *in the Chair.*

K. SHELLEY BONNERJEE, Esq.
FRANK CARTER, Esq.
G. S. E. COLVILLE, Esq.
F. H. EGGAR, Esq.
W. G. FIGG, Esq.
A. C. LAW, Esq.
G. L. SIDEY, Esq.

F. H. ABBOTT, Esq., *Secretary.*
S. PERCY-LANCASTER, Esq., F.R.H.S., *Asst. Secretary.*

The Minutes of the Meeting held on the 27th June 1913, which had already been circulated, were confirmed.

Applications from the following parties desirous of becoming members, which had already been circulated, were placed before the meeting and the elections duly confirmed :—

BABU AMRITA LAL GHOSH.
MRS. EZRA COHEN.
SYED QUMRUL HUDA.
H. H. NAWAB SULTAN JEHAN BEGUM, THE RULER OF BHOPAL.
J. BARENDRECHT, Esq.
EARDLEY NORTON, Esq.

The following flowers were arranged on the table :—

Acacia moliniformis.
Barringtonia acutangula.
Jacaranda mimosæfolia.

Minutes of the Ordinary Monthly Meeting of the Council of the Agri-Horticultural Society of India, held on Friday the 26th September 1913, at the Society's Gardens, Alipore, at 7-30 a.m.

Present:

F. H. EGGAR, Esq., *in the Chair.*

G. S. E. COLVILLE, Esq.	G. L. SIDEY, Esq.
FRANK CARTER, Esq.	T. E. T. UPTON, Esq.
Babu A. C. LAW.	E. A. WATSON, Esq.

F. H. ABBOTT, Esq., *Secretary.*

S. PERCY-LANCASTER, Esq., F.R.H.S., *Asst. Secretary.*

The Minutes of the Monthly Meeting held on the 22nd August 1913, which had already been circulated, were confirmed.

The name of the following gentleman desirous of becoming a member of the Society was submitted and he was duly elected :—

Sri-Sri SRI KRISHNA CHANDRA GAJPATI NARAYAN DEO GARU, Zemindar of Parlakimedi.

A few sprays of Hybrid Canna and Stemmadina bella were exhibited.

Minutes of the Ordinary Monthly Meeting of the Council of the Agri-Horticultural Society of India, held on Friday the 24th October 1913, at the Society's Gardens, Alipore, at 7-30 a.m.

Present:

GEO. GIRARD, Esq., F.R.H.S., I.S.O., *Vice-President, in the Chair.*

FRANK CARTER, Esq.
F. G. CLARKE, Esq.
G. T. E. COLVILLE, Esq.
Babu A. C. LAW.

F. H. ABBOTT, Esq., *Secretary.*

S. PERCY-LANCASTER, Esq., F.R.H.S., *Asst. Secretary.*

The Minutes of the Monthly Meeting held on the 26th September 1913, which had already been circulated, were confirmed.

Flowers of Couroupita guianeensis, Diaclea lasiocarpa and the two varieties of Hibiscus subdarrifera were arranged on the table.

Minutes of the Ordinary Monthly Meeting of the Council of the Agri-Horticultural Society of India, held on Friday the 28th November 1913, at the Society's Gardens, Alipore, at 7-30 a.m.

Present:

GEO. GIRARD, Esq., F.R.H.S., I.S.O., *Vice-President, in the Chair.*

F. G. CLARKE, Esq.
G. S. E. COLVILLE, Esq.
W. G. FIGG, Esq.
Babu A. C. LAW.
G. L. SIDEY, Esq.

F. H. ABBOTT, Esq., *Secretary.*

S. PERCY-LANCASTER, Esq., F.R.H.S., *Asst. Secretary.*

The Minutes of the Monthly Meeting held on the 24th October 1913, which had already been circulated, were confirmed.

The names of the following gentlemen desirous of becoming members of the Society were submitted and duly elected :—

MAJOR C. J. MEADE (Rejoined). | G. B. DEAKIN, Esq.

Spikes of the several Barleria hybrids and parent plants together with flowers of Camoensia maxima and Aristolochea Bonplandi were arranged on the table.

CONTRIBUTIONS.

Records of the Geological Survey of India, Vol. XLIII, parts 1 and 2 of 1913. 2 copies. From the Government of India.

Annual Administration Report of the Government Botanical Gardens and Parks, the Nilgiris, for the year 1912-1913. 1 copy. From the Collector.

Report on the Government Agri-Horticultural Gardens, Lahore, for the year 1912-13. 1 copy. From the Superintendent.

Report of the Civil Veterinary Department, Assam, for the year 1912-1913. 1 copy. From the Director.

Season and Crop Report of the Central Provinces and Berar, for the year 1912-13. 1 copy. From the Director.

Annual Report on the Botanic Gardens, Singapore and Penang, for the year 1912. 1 copy. From the Director.

Agricultural Statistics of Bihar and Orissa, for 1911-1912. 1 copy. From the Director.

Report of the Government Horticultural Gardens, Lucknow. 1 copy. From the Superintendent.

Season and Crop Report of Burma, for the year ending the 30th June 1913. 1 copy. From the Director.

Season and Crop Report of Bihar and Orissa, for the year 1912-1913. 1 copy. From the Director.

Report on the Season and Crops of Assam, for the year 1912-1913. 1 copy. From the Director.

Report of the Government Botanical Garden, Saharanpore, for the year ending 31st March 1913. From the Director.

Proceedings of the Board of Forestry meeting held at Dehra-Dun between the 24th and 29th March 1913 with Appendices. 1 copy. From the Director.

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Statistical Returns with a Brief Note of the Registration Department of Bengal, 1912. 1 copy. From the Government of Bengal.

Agricultural Statistics of Bengal for 1911-12. 1 copy. From the Government of Bengal.

Season and Crop Report of Bengal, for the year 1912-1913. 1 copy. From the Government of Bengal.

Census of India, 1911, Vol. V of Bengal, Bihar, Orissa and Sikkim, part 1. Report 1. 1913 and part II of Bengal Tables by L. S. S. O'Malley, Esq., I.C.S., 2 copies in all. From the Government of Bengal.

The Agricultural Journal of the Union of South Africa, Vol. V, No. 5, for May 1913 and Vol. VI, No. 1, for July, No. 2, for August and No. 3 for September 1913, 4 copies. From the Government of South Africa.

Royal Botanic Gardens, Kew, Bulletin of Miscellaneous Information, Nos. 4, to 8 of 1913 and Appendix III of 1913. 6 copies in all. From the Director.

Department of Agriculture, Burmah, Bulletin No. 8 of 1912, Cotton-Pests in Burma and Bulletin No. 9 of 1913. Cultivation of Grape Vine. Bulletin No. 10 of 1913. The Chemical Composition of Paddy Mill Products. 1913. 3 copies in all. From the Director.

Department of Agriculture, Bengal, Annual Report of the Burdwan Farm, for the year 1912-13. 1 copy. From the Government of Bengal.

Annual Report of the Rajshahi Agricultural Station for the year 1912-1913. 1 copy. From Government of Bengal.

Annual Report of the Burirhat Agricultural Station,

for the year 1911-1912, and 1912-13. 2 copies. From Government of Bengal.

West Indian Bulletin—The Journal of the Imperial Agriculture Department for the West Indies, Vol. XIII, No. 2 of 1913, and Vol. XIII, No. 3 of 1913. 2 copies. From the Director.

• Journal of Agricultural Research Department of Agriculture, Washington, D. C, Vol. I, No. 1 of 1913. 1 copy. From the Director.

The Journal of the Royal Horticultural Society, Vol. XXXIX, part 1 of August 1913. 1 copy. From the Society.

The Philippine Agricultural Review, Vol. VI, Nos. 5, 6, 9 and 10, for May, June, September and October 1913. 4 copies. From the Director.

The Agricultural News, a fortnightly Review of the Imperial Department of Agriculture, for the West Indies, Vol. XII, Nos. 288, to 299 from 10th May to October 11th, 1913. 12 copies. From the Director.

Memoirs of the Department of Agriculture in India, Agricultural Research Institute, Pusa, Botanical series, Vol. VI, Nos. 1, 2 and 5 for the quarter ending June, July and October 1913. 3 copies. From the Government of India.

The Agricultural Journal of India. Agricultural Research Institute, Pusa, for July quarter 1913 and for October quarter 1913. 2 copies. From the Government of India.

Bulletin No. 34, Agricultural Research Institute, Pusa. Diseases of Rice. 1 copy. From the Government of India.

Federated Malay States Government Gazette, Vol. V, Nos. 26, to 57, from 27th May to 26th November 1913, and also supplement to the above Gazette for August 1st, 15th and September 23rd, 1913. From the Government of Malay States.

Annual Report of the Dacca Agricultural Station for the year 1912-13. 1 copy. Annual Report of the Rangpur Demonstration Farm, for the year 1912-13. 1 copy. From the Government of India.

Annual Report of the Demonstration, St. Andrew's Colonial Homes, Kalimpong, for the year 1912-13. 1 copy. From the Government of India.

Annual Report of the Chinsurah Agricultural Station, for the year 1912-13. 1 copy. From the Government of India.

Records of the Botanical Survey of India, Vol. IV, Nos. 7 and 8, for 1913. 2 copies. And Vol. VI, No. 2, for 1913. 1 copy. From the Government of India.

Bulletin of the Department of Agriculture, Vol. 2, No. 7, New series of 1913. 1 copy.

The Agricultural Ledger No. 6 of 1911-12. 2 copies. From the Government of India.

Brooklyn Botanic Garden Record, Vol. II, Nos. 1, 2, 3 and 4, for January—March, April—June, July—September and October—December, 1913. 4 copies. From the Director.

Department of Land Records and Agriculture, United Provinces of Agra and Oudh, Bulletin Nos. 28 and 29, Agricultural series. 2 copies. From the Director.

Department of Agriculture, Bombay, Bulletin No. 54 of 1912. 1 copy. From the Director.

Department of Agriculture, Bihar and Orissa, Department Records, for 1913. No. 2. Notes from the Bengal Fisheries Laboratory, Indian Museum, No. 1, on some Fish Parasites. 1 copy. From the Government of Bihar and Orissa.

Proceedings of the Agri-Horticultural Society of Madras, for January—March and April—June, 1913. 2 copies. From the Society.

PRESENTATIONS.

A. Cooke, Esq., Ranchi—
Seed of Cochlospermum Gossypium.

The Curator, Botanic Gardens, Durban—
20 Tubers Gloriosa virescens.

The Curator, Royal Botanic Gardens, Sibpur—
5 lbs. Mahogany seed.
1 Pkt. Malpighia Punicæfolia.

Mrs. Seth Apcar, Queens Park, Ballygunge—
1 Aglaonema species.
1 Ophiopogon marginatus.
40 Narcissus bulbs.

The Secretary, Madras Agri. and Horticultural Society, Madras—

1 Schisamatoglottis Lavellier.
1 Aglaonema picta—compacta.
1 Thrinax argentea.
1 Carludovica species.
1 „ Drudii.
1 Acrocomia corrallina.
1 Phoenix rupicola.
1 Arenga apeng.
1 Alocasia Johnstonii.
1 „ Lindeni.
1 „ Lowii.
1 „ Sanderiana.
1 „ Macrohiza.
1 „ Thibautiana.
8 „ species.
13 Dieffenbachia of sorts.

Revd. Fr. Cardon, S. J. Ranchi—
4 Pineapple suckers, Countess of Rothschild.

John Davenport, Esq., Queens Park, Ballygunge—
1 Pkt. seed Acacia pycnantha (Golden wattle).
1 „ „ Acacia Baileyana (Cootanamdra wattle).
1 „ „ Boronia migastigma.
25 Australian Violets.

W. H. Hunter, Esq., Calcutta—
1 Pkt. seed Hibiscus coccinea.
1 „ „ „ Manihot.
1 „ „ Africanus major.
9 Cuttings Hibiscus species.

J. Stephen, Esq., Calcutta—
2 Nandia domestica.

E. H. Muller, Esq., Parlakimedi—
Seed of Lagerstromia flos Reginæ (var).

Babu Gosto Behary Seal, Calcutta—
3 Begonia of sorts.
4 Dracaena species.
5 Croton new.
3 Other plants (unnamed).
25 Seed Martinezia erosa.

FRONTISPIECE.

Melocanna bambusoides (Bambusa baccifera). *Vern*: Muli or Moorli, The Terai Bamboo.

This is an evergreen arborescent bamboo, unarmed and beautifully erect without any bend or inequality of surface. It grows in its habitat, the Chittagong hills, to the height of 30—50 feet and having a circumference of 12—13 inches at the base. Melocanna, though indigenous to Chittagong, is found all over Eastern Bengal and Burma, it delights in a sandy soil and dry spots suit it admirably.

The culms sprout from an underground ramifying rhizome at some distance from each other and though thin walled the bamboo is strong and durable being largely used for mats and building purposes. It is also observed that white ants and other insects so destructive to the dry bamboo seldom attack Melocanna. This bamboo also yields more or less *tabasheer* locally called choona (lime) but its most

remarkable feature is the large fleshy fruit it bears. This berry is in shape like an inverted pear, 3 to 5 inches long, with a long curved tapering point. There is a single oval seed inside the pericarp and the fruit is eaten by the natives though one can hardly imagine a person enjoying a meal of "bamboo pears" except as last resort.

We are indebted to Mr. G. L. Sidey of Messrs. Octavius Steel and Co. for the photograph.

INTERESTING NOTES.

THE SPONTANEOUS APPEARANCE OF A SELAGINELLA.

The Society's Fruit grafts are stocked under a large clump of Mangoe trees and the beds on which the pots are kept are floored with cinders which were laid down in 1902 or 1903. This year, shortly after the rains were over, it was noticed that there were dense green masses under some of the mangoe trees and in among the pots of lime, oranges, etc. On closer examination this proved to be a selaginella which has since been identified as Selaginella imbricata or Selaginella proniflora. The question now arises where did this Selaginella come from and how is it that it never appeared before.

It has been suggested that the excessive rainfall this year washed up the spores of the Selaginella from some lower strata ; no trace however of the variety having ever been in the Society's collection can be found.

ANSWERS TO CORRESPONDENTS.

It has been found on several occasions that enquiries on the same subject have come in from our members in different parts of the country and one is led to believe that many would appreciate assistance in the way of remedies, etc., to help them to battle against insect and fungoid pests which attack their plants.

All correspondence on such subjects, dealt with by the Society, will be reported briefly in these columns.

* * * * *

P. W. The young leaves of my mangoe trees shortly after they turn a coppery colour are found every morning on the ground neatly cut off by a "*Keera*" so my mali says; what can I do?

Answer. Your mangoe leaves are bitten off by a beetle bearing the high sounding name of Engnamptus marginatus. Pick these insects off when you can, for they are remarkably quick at disappearing, or spray Lead chromate on the leaves, 2oz. to 4 gallons of water. You will notice that the plant seems to suffer very little from the loss of its leaves.

GREEN. The Ixora plants in one portion of my garden never look healthy, their foliage always being a yellowish green. There are no insects at the roots.

Answer. Try watering the plant with $\frac{3}{4}$ oz. of sulphate of iron dissolved in 5 pints of water.

"TALAO." Is there any way of getting rid of that dirty green scum one sees on many tanks?

Answer. The green scum is pond-weed and can be destroyed by spraying a dilute solution of Sulphate of copper (green vitriol; Toothia in vernacular) on the surface of the water or better still drag a bag containing the sulphate of copper over the surface.

T. D. Most Tennis Courts suffer from unevenness caused by worm casts. Can you recommend any simple stuff to remove the worms.

Answer. Water the ground with 1/2 oz: corrosive sublimate (bichloride of mercury) in 15 gallons water or clean lime water resulting from mixing 2 lbs of quick-lime in 15 gallons of water. Soap suds or a desert spoonful of phenyle to a palful of water applied to 4-5 square yards will bring the worms to the surface.

CANNAS.

S. PERCY-LANCASTER, F.R.H.S.

There are a large number of Botanical species of the canna but as in this article only Horticultural varieties are being dealt with, just those few that have actually been used in improving the Florist's canna, will be described.

The strides made in hybridising are nowhere so apparent as in the canna as a comparison between *indica* and say, the *Orchid flowered varieties* will shew.

The original varieties were chiefly cultivated for foliage—giving quite a "Tropical effect" to a garden—and were commonly called Indian shot, in allusion to the small black seed of *indica* which resembles buck-shot.

This type has flowers measuring $\frac{1}{2}$ to an inch across and narrow petals about $\frac{3}{8}$ to $\frac{1}{2}$ inch in width, the flower being usually 2 petalled.

For many years steady improvement was noticed in the number of shades and size of flower till in time *the Dwarf French or Crozy* type superseded it. Then in 1910 a new type, the *Dreadnaught*, was introduced by the Society

which, besides being very dwarf and floriferous produces flowers 6 inches in diameter with massive petals 2 to 2¼ inches broad and of great substance, lasting longer than the ordinary Crozy varieties.

The *Orchid* or *Giant flowered* type are a class by themselves and on account of the difficulty of hybridising, only a short range of colours is in existence.

Owing to the ease with which the canna can be propagated every garden possesses a clump or two but in the great majority of cases the plants seem to run more to leaf than to flower. Sometimes the situation in which the canna is planted is the chief cause of this, shade preventing proper flowering and forcing the plants into leaf. There are of course many varieties which run to leaf more easily than others but these are gradually being eliminated.

After many years of experiment it has been found that a light well-manured soil and only a small supply of water is necessary for the canna; being a gross feeder any fresh manure can be used, provided white ants are not too plentiful in the locality.

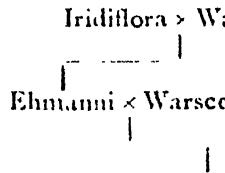
Propagating the canna from seed is next to impossible as the majority of varieties are hybrids and produce a mixed progeny which can never be depended upon to give the desired colour, hence division of rhizome is the safest and easiest way.

Botanically, the canna flower is composed of three small green sepals attached to the capsule or seed pod, while the petals are the three narrow incurved spike-like leaves. These are firm in texture and green, yellow or reddish according to the colour of the variety. The showy parts of the flower, what are generally known as petals, are in reality the stamens which have become brightly coloured.

These "Petaloid Staminodia" are unequal in size and to the margin of one of the inner ones the single celled anther is attached.

To simplify description let us make the error of calling the stamens "petals;" then the canna flower resolves itself into 3 petals and a lip with a flat scimitar-like pistil and a "standard" on which the anther is affixed.

The table below gives the parents of three of the chief types of canna, and a short description of their differences.



Giant or Orchid flowered.

Iridiflora differs very slightly from *indica* in size of flower, these are rose coloured with a yellow spot on the lip and the flower spikes droop somewhat. The plant grows from 6 to 8 feet high.

Warscewiczii has flowers, purplish crimson in colour, and the leaves are green marked and margined chocolate: height 3 feet.

Ehmanni, colour lilacy carmine while the flowers droop from the spike, the plants growing very tall, 6—8 feet.

Flaccida has large flowers resembling *Iris pseudo-acorus*—bright yellow in colour but with flaccid petals and flowers transitory in consequence, height $2\frac{1}{2}$—3 feet.

Indica type—This canna is seldom cultivated though huge clumps are to be found in any waste bit of land. It is the original Indian shot and the following five varieties were in cultivation for many years.

INDICA—dark red flowers, green foliage.

PORTEANA—dark red flowers, bronze foliage.

IVORY QUEEN—dark red flowers, with creamy white outer petals, green foliage.

GOLDEN ORIOLE—yellow flowers, green foliage.

VARIEGATA—scarlet flowers like indica, foliage bronzy green splashed red and white when young.

Annee hybrids.—There is no record of hybrids of the *indica* type but in 1859 we see a mention made of canna hybridisation having been seriously undertaken by Monsr. M. Annee and we find mention made of Annei rosea, A. bicolor and many others but as no measurements of the flower are obtainable one can only conjecture that they were larger than *indica*.

Pre-Crozy.—

This section, which was probably the fore-runner of the Crozy type was a great improvement on the *indica*. The flowers measured $2\frac{1}{2}$—3 inches across and comprised several shades of colour as the few varieties enumerated below will show, the petals were $\frac{1}{2}$—$\frac{3}{4}$ inches wide.

AVENIER—orange.

ED. ANDRE—scarlet.

BERTHA SUZE—yellow spotted scarlet.

GUILLAME CONTON—orange vermillion.

Presdt. Carnot—vermillion.

ASA GRAY—pale orange.

CANARY BIRD—yellow.

HENRI DE VILMORIN—orange scarlet.

Crozy type.—

Then came the Crozy type with flowers 3—4 inches across and petals 1—$1\frac{1}{2}$ inches wide and as these varieties were very floriferous, canna came into fashion and soon a host of new kinds were on the market. Of these the following are the best varieties and are still largely grown.

GLADIATOR—yellow spotted scarlet.

BLACK PRINCE—deep ruby maroon.

NIAGARA—yellow splashed scarlet.
SEMAPHORE—golden yellow, bronzy foliage.
MT. BLANC—cream fading white.
MADM. CROZY—scarlet edged yellow.
BUTTERFLY—yellow spotted scarlet.
DUCHESS OF YORK—carmine bordered yellow.
HIAWATHA—rosy salmon, bronze foliage.
METEOR—orange scarlet.

The Society commenced hybridising canna on a small scale as far back as 1890 and the accompanying varieties show that a steady advance has continued.

1890—CLEOPATRA—salmon.
CHARMION—yellow and scarlet.
MORISCA—vermillion scarlet.
OTOMIE—salmon edged yellow.
IDA—pale canary.

1893—GEO. KING—carmine pink.
1894—C. C. STEPHENS yellow dotted scarlet.
1895—LADY MACKENZIE—apricot edged gold.
1896—COUNTESS OF ELGIN—rich salmon, drooping flowers.
DORIS—dark ruby.
STAR OF INDIA bright yellow ground, scarlet splashes.

1897—MAHARAJAH OF DHURBHUNGA—vermillion pink bordered yellow.

1898—MONA—pale salmon pink.
1900—VICE VERSA—orange scarlet.
OLIVE—orange vermillion.
SCARLET BOQUET—dark ruby, bronze foliage
YELLOW GAL—rich lemon yellow.
ORANGE PLUME—orange.
MAUD—orange scarlet.
MARGERY—deep rosy red.
DONALD—orange vermillion.

1903—SYDNEY—orange.
What Ho !—parti-coloured orange and yellow.
ETHEL—orange red.
MONARCH—Improved Star of India.
BLACK KNIGHT—deep claret red.
DREADNAUGHT—yellow heavily spotted scarlet.
KATHLEEN—pale apricot edged gold.
NELLY—yellow, base of petals red.
PERCY—deep rosy madder.

In 1904 all importations of new varieties were stopped as it was found that the Society's varieties Monarch, Black-knight and Dreadnaught were almost indentical with Niagara, Black Prince and Gladiator. Most of the older kinds of canna were hybridised with these large flowered varieties and many improved canna are now listed under the old names.

Two "white," or rather pale cream, varieties had been obtained from America in 1903 and hybrids from these gave varieties with flowers of delicate shades of colour; these appear in the list of Art Shades.

The following are just a few of the Crozy type of canna, improved and introduced by the Society, which are specially recommended.

LORD ROBERTS—rosy carmine.
THE SULTAN OF ZANZIBAR—scarlet.
PRESIDENT—terra cotta lined with a thread of gold.
SOLFATERRE—deep orange.
STRIPED QUEEN—deep yellow, striped scarlet.
ORANGE SHOWER—rich orange yellow.
VICERREINE—soft terra cotta shaded lemon.
PRIMROSE—pale sulphur yellow.
HER MAJESTY—orange vermillion spotted scarlet, foliage bronze.
LOUISE—yellow, lip spotted scarlet violet.

VIOLET—magenta pink.

IDEAL—deep yellow with standard and base of lip maroon.

PERCY LANCASTER—deep yellow heavily spotted scarlet.

ETNA—bright golden yellow with scarlet streaks and veins.

LEGION OF HONOUR—rosy pink margined straw.

SUNBURST—a lovely shade of orange yellow.

MAHARAJAH OF PATIALA—yellow spotted scarlet.

A SELECTION ART SHADES OF THE CROZY TYPE.

MORNING GLOW—cream shaded apricot.

ALIPORE BEAUTY—old rose, lined and spotted deeper.

FLEUR-DE-LYS—rosy salmon, long drooping petals.

MRS. SALE—rosy madder edged cream.

MRS. EGGAR—cerise pink.

HAYDEE—rosy madder.

ROSE QUEEN—pale rosy pink.

AURORA—salmony terra cotta.

SETTING SUN—orange yellow, feathered scarlet fading to white and scarlet, foliage bronze.

MAMIE—pale yellow, shaded apricot.

GOLDEN DROP—pale yellow, foliage bronze.

TAJ MAHAL—cream spotted pale pink.

MRS. LANCASTER—rich butter yellow.

LADY CARMICHAEL—strawberry pink.

THE COMET—creamy white, pencilled scarlet.

CHERUB—soft peach pink, with pale lemon edge.

REVE D' ETE—rosy salmon on lemon ground.

ZULEIKA—pale creamy white spotted red.

THE ORIENTAL—delicate rosy apricot, edged lemon and spotted red.

Dreadnaught. This is an improved dwarf Crozy variety producing large broad petaled flowers and has been introduced by the Society.

KING GEORGE—vermillion scarlet edged gold.
WARRIOR—scarlet spotted deeper, foliage bronze.
THE CZAR—vermillion scarlet.
GOLD FINCH—deep buttercup yellow.
PRINCE OF WALES—pale vermillion.
AJAX—orange vermillion, foliage bronze.
JOHN BULL—pale scarlet, foliage bronze.
KING EMPEROR—velvety scarlet, foliage bronze.
RED DRAGON—light scarlet.
COEUR DE LION—scarlet edged gold, foliage bronze.
ADONIS—carmine pink.
IMPERATOR—orange scarlet.
CORONATION—yellow heavily splashed scarlet.

There are besides these many other shades of yellow and several unnamed seedlings belonging to this section.

Among the Crozy type of canna there have been several grotesque or curious forms which are referred to below.

PIGMY.—In 1911 a seedling in the hybrid beds was noticed to be particularly dwarf. This was watched carefully and found to grow two feet high in the rains and only 8 to 12 inches during the cold season. It was hoped to use this pigmy variety for a new type and though several hybrids were made so far only two new dwarf plants can be reported on.

DRAGON'S TOOTH was a scarlet canna margined gold with a peculiar thin thread like appendage appearing at the end of a square cut petal. This variety was accidentally destroyed among rejected canna but prior to this, hybrids from it gave only the square cut petal.

WHAT HO!—This freak had thick waxy petals some flowers half vermillion and half yellow while others were wholly yellow or vermillion. It was not very attractive except as a curiosity; unfortunately the whole stock was lost during the monsoons 1913.

Etna is one of the hybrids from the above and possesses petals of similar texture.

URANUS.—This is another curious variety belonging to the bordered section but has the colour translocated, that is, the usually paler coloured margin is replaced by the darker ground colour. The several hybrids from Uranus are unique and though not large flowered are worth cultivating; with one exception all these canna have bronzy foliage.

URANUS—ground colour pale pinky cream, margin deep rosy madder.

SATURN—ground colour pale dull orange, margin deep vermillion.

VENUS—ground colour pale salmon pink, bordered slightly deep carmine.

MARS—deep cerise pink, bordered crimson foliage green.

JUPITER—a salmon cerise, edged a deep cerise.

MERCURY—pale orange salmon margined deep carmine.

REFULGENS, though possessing fine broad petals unfortunately loses all its good points by having drooping spikes of flower, and as several hybrids from this canna developed the weeping habit the type was discarded as a parent.

EHMANNI—This has already been mentioned as one of the parents of the Crozy and Orchid flowered type but it is also remarkable for the unique colour and shape of flower. The base of the petals are very closely pressed together thus giving the flower a striking resemblance to the Orchid flowered type. *Ehmanni*, *E. minor and Geo. King* are all shades of lilacy carmine while *Violet*, which is also of the same shade, is a hybrid from the Crozy but takes after the Crozy type of flower.

DRACÆNÆFOLIA—Two seedlings from the Society's hybrids beds were very distinct, neither of these flowered for at least three years but kept on producing Dracaena-like foliage. When they did ultimately come into bloom the

green leafed variety with yellow flowers was rejected, but *Dracænæfolia* with scarlet flowers and bronzy green foliage has been retained. This forms quite an ornamental foliage plant.

SPORTS FROM CANNA.

The Giant flowered variety *Parlenope* sent up a spike on which some flowers were half red and half yellow (*Austria*) and others entirely red or yellow. This has been reported in the Society's Journal for Oct.-Dec. 1898.

The Crozy variety *Mrs. Eggar* has also given a sport, some plants produce a pale strawberry pink flowered spike while a flower or two can usually be found with half the petals the deeper pink of *Mrs. Eggar*.

Golden Drop with deep yellow flowers spotted red and bronze foliage has given a sport which produces a cream coloured flower flushed pink with a deep red throat and lip spotted red.

The Leper, another bronze leafed variety with creamy pink flowers bordered carmine sported to an orange scarlet variety bordered scarlet.

These have also been reported in the Journal for Jan.-June 1913.

Canna *Butterfly*, a yellow spotted red Crozy variety, produces from time to time double flowers with from 7 to 14 petals but with all other parts of the flower missing. Attempts to keep the variety double have failed.

CANNA IDA (SYN. FLACCIDA LE ROI) was introduced in 1890 and is a night flowering variety. It resembles the Orchid or Giant flowered canna, in general appearance of bloom, the colour being a very delicate canary and the petals beautifully waved and crimped. The flowers are unfortunately of ephemeral duration and opening after sunset are not usually noticed. The plant is of very dwarf habit growing from 2—2½ feet.

The Giant or Orchid Flowered type—These Canna are so named because they resemble an expanded Cattleya but have also been likened to a large Japanese Iris. The substance of the petals is very thin and delicate and the flower in consequence very fugitive. Each spike usually produces only four to six flowers measuring 5 to 7 inches across; the deep bronze leafed varieties are quite effective when massed together. This type was introduced by Mons. Dammann of Naples in 1893 and out of the forty odd varieties introduced, there are few in general cultivation. The following are the most distinct:—

Asia—flowers rich golden yellow dotted scarlet.

Alemannia—flowers scarlet bordered yellow.

Pluto—bronze foliage, deep scarlet purple flower, flamed red.

Pennsylvannia—flowers deep crimson scarlet.

Bavaria—flowers golden yellow blotched scarlet.

Britannia—flowers yellow flamed carmine scarlet.

Edward Andre—flowers fiery red spotted orange yellow.

Italia—flowers yellow flamed scarlet.

Mrs. Kate Gray—flowers orange scarlet, striped golden yellow.

Perseus—flowers canary yellow pencilled scarlet.

America—bronze foliage, fiery reddish purple flower.

La France—bronze foliage, scarlet flower striped yellowish red.

Indiana—flowers deep orange yellow.

King Humbert—bronze foliage, deep scarlet flower with darker spots.

Wyoming—bronze foliage, deep orange yellow flower.

Australia—flower salmon red striped deep sulphur yellow.

Suevia—flowers canary yellow with bronze quard petals.

Pandora—bronze foliage, fiery red with margins yellow flowers.

Trinacria—flowers sulphur fading white.

Ch. Naudin—flowers salmon red centre deeper.

SHORT NOTES AND DESCRIPTIONS OF PLANTS ADDED TO THE SOCIETY'S COLLECTION AND APPEARING IN THE REVISED PRICE LIST 1910 EDITION.

Bulbs and Tuberous Plants.

Aglaonema. Three new kinds have been obtained, *Hookeriana* and *oblongifolium* with green foliage, and *versicolor* of dwarf growth with small greeny yellow leaves blotched with shades of pale and dark green.

Alocasia; of the new varieties *argyrcia*, has arrow shaped foliage, veined white, the entire leaf gradually assumes a silvery appearance while the under surface is deep bronze.

cuculata has curious green leaves and *guincensis* is a low growing plant with the heart shaped green leaves blotched pale creamy white. *hybrida* resembles *argyrcia* in general appearance but has smaller leaves which do not become silvery and less colour at the back.

Mortfontanensis has dull bronzy leaves with a slightly wavy outline and resembles *Sedeni* very much.

species Java, Singapore and *Mergui* differ very slightly from each other, the long arrow shaped leaves are veined more or less with white and they are all tall growing kinds.

Amomum Dianelli resembles *vitellinum* in general appearing, the leaves have a dark maroon midrib while the flower spike is paler in colour.

Anthurium. Alipurense, Lancasteri and *Ferrierense rubrum* are flowering varieties—the first two were described the Society's Journal, (July—December 1912) and the last named differs from the type only in the dark red spathe.

crytallinum illustris has its green leaves blotched creamy yellow.

coriaceum, *species Java* and *tetragonum* are all foliage plants, differing in shape of leaf.

Van Houttei is a tall growing variety with large canna-like foliage and an immense white spathe.

Cooperia Oberwettii and *pedunculata* have white flowers and resemble *Drummondii*, the foliage of these varieties however is much narrower.

Coo-zephyr. This has been renamed in keeping with the rule of nomenclature *Cooperanthes* and the plants were fully described in the Society's Journal (July—December 1911).

Crinum. Several varieties from the new kinds listed appear to be synonyms but *Lancasteri*, a garden hybrid, has beautiful pink flowers and broad shining foliage. This was described in the Society's Journal (July—December 1912).

Dianella ensifolia resembles *nemorosa*, differing merely in the leaves being narrower and more upright.

Dieffenbachia. Many new varieties, chiefly garden forms, have been added to the collection of *Dieffenbachia*; these are variously marked and spotted.

Drimiopsis (*Liliaceæ*) *Kirkii*. This lily-like plant has pale green leaves blotched irregularly with darker green and a tall spike of small greenish white flowers. Propagated by division.

Episcia tesselata. A dwarf succulent-plant growing about a foot high, the flowers are white while the leaves are of a dull brown colour and have a wrinkled appearance.

Funkia. Three new *Plantain lilies* have been added to the collection; these are *cuculata*, *grandiflora* and *robusta albo-variegata*. The last named has variegated foliage as the name signifies, while the former two are flowering varieties.

Gesnera. Three *elliptica* varieties are now listed, the

flowers differ in colour resembling the flower of *Tecoma capensis* in shape.

Hedychium. The flowers of *aurantiacum* and *aureum* are both smaller in size than *coronarium* but shades of yellow in colour

ellipticum (*marginatum*) produces a large circular head of small white flowers which is very striking in appearance.

spicatum var: *Khassiana* has pale lemon coloured flowers with a delicate scent. This is very difficult to keep alive in Calcutta.

Heliconia brevispatha grows 4—6 feet high and has dark green foliage with an orange flower spathe which appears at the top of the plant.

Homalonema aromatica and *erubescens*: anthurium-like plants with large cordate leaves, the former has green leaves with an ivory stem while the leaves and stem give out a delicate scent when bruised; *erubescens* has its green leaves shaded red, the stems being deep red; both are very ornamental varieties.

Maranta. A number of these foliage plants have been added to the Society's collection but the descriptions are not given in detail owing to the difficulty of explaining the differences of foliage.

Moraea (*Irideæ*) *iridioides* a tall Iris like plant with narrow foliage and producing white flowers. Propagated by division of bulbs.

Nephthytis (*Aroideæ*) *picturata.* A handsome ornamental plant with cordate anthurium-like leaves, the deep green veins and midrib showing up well on an ivory background. Propagated by division.

Ornithogallum (*Liliaceæ*) *Saundersii.* A lily-like plant producing a tall spike of small white flowers. Propagated by division.

Schismatoglottis pulchra is a dwarf ornamental aroid with pale green leaves feathered on both sides of the midrib with grey white.

Siamensis is also of dwarf growth with green leaves slightly spotted ivory white.

Zephyranthes. Four new varieties have been added to this useful crocus like family. *Texana* yellow flowered.

Tretiae and *rerecunda* white and *Wrightii* lilacy white.

BLUE HORTENSIA (HYDRANGEA).

The *Gardener's Chronicle* for June 1913 refers in its Editorial to the production of blue flowers in rose pink varieties of the Hydrangea. Scientifically very little is known about the change of colour in flowers except that iron and alum sometimes succeed in bringing about the desired shade.

It has been suggested that treatment should commence at least a year in advance as the cellular tissue of the flower must absorb the iron salts. Then again if the soil is at all chalky or rich in lime no amount of watering will do any good. The soil must be changed to one which is non calcareous.

Mr. Henri Bliss recommends the following mould for potting Hydrangeas, ⅔ leafmould; ⅓ sand; 10% powdered slate; 3%—10% sulphate of iron and 10% ammonium sulphate. The plant to be experimented with should have all the earth removed from its roots and be repotted in the above compost.

Rain water and manure may be liberally supplied, say twice a week during the growing period as well as ¼ oz. sulphate of iron while iron filings may be added to advan-

tage. Another correspondent recommends sulphate of ammonia and Guano which have given excellent results but in this case also the soil must be free from lime.

There are also two preparations offered by the trade. Azure from Messrs. Cutbush and Sons, Highgate, and Cyanol, a continental preparation, obtainable at several florists.

HOW TO HYBRIDISE.

A Manual of Hybridising for Amateurs.

(S. *Percy-Lancaster*, *F.R.H.S.*)

There are so many species of shrubs, creepers and trees which flourish and seed freely in India, lending themselves readily to hybridising and Horticultural improvement, that it seems a pity few people ever attempt to create new forms and colours. The Society has been very successful in this branch of experiments, especially with it's Canna and Hibiscus, and it is hoped that these notes, which are the outcome of practical work, will be helpful to Amateurs throughout India.

I am greatly indebted to Major A. T. Gage, I.M.S., of the Royal Botanic Gardens, Sibpur, for his kind assistance in glancing through these notes and giving me his advice.

* * * *

Necessities—

The undermentioned articles will be needed for hybridising plants and can be purchased at a trifling cost in any market.

(1) A small pair of fine forceps or tweezers.

(2) Two camel-hair brushes, such as are used for water-colour painting, Nos. 3 and 4 would be suitable.

(3) A sharp two-bladed pocket penknife.
(4) Some absorbent cotton.
(5) A six-inch length of sharply pointed wood or bamboo, the thickness of a lead pencil.
(6) A couple of dozen pieces of waxed twine, cut into four-inch and six-inch lengths.
(7) A small phial of Methylated spirits or Alcohol.
(8) Some odd pieces of mosquito net or muslin.
(9) A note book.

For convenience sake a leather-covered pocket book has always been used, the forceps, etc., being placed in the several pockets.

The Forceps are for removing the anthers, and in some cases the filaments from the flower to be fertilized, as well as for holding the larger anthers when applying the pollen to the stigma.

The brushes may be used for conveying the pollen to the stigma, when it is not desired to destroy the anthers of the pollen parent, or, if on the other hand, the anther is difficult to remove. The brush also conveys the pollen with a minimum of waste.

Absorbent cotton will be needed when working with plants that exude a milky juice, such as the Plumeria and Oleander.

Waxed twine is needed to mark the flowers hybridised, the process of marking being called "tagging."

Supposing that several flowers in the same bunch have been fertilised with different pollen, a small label or disc of tin should be attached to the twine, marking each flower. The simplest way of marking the ticket will be with a nail, punching a hole for each number, the numbers corresponding with those in the note book. If zinc tickets are used polish them with burnt brick or sandpaper and use a saturated solution of sulphate of copper (Blue-stone. Vern:

Toothia) as ink. A quill or wooden pen is better than a steel one.

The pointed stick is used in fertilising orchids.

Methylated spirits or Alcohol is to sterilise the forceps and fingers after each flower is fertilised to prevent any foreign pollen being conveyed to the stigma of the flower.

Work the mosquito net or muslin into rough bags with a draw thread at each end for enclosing the fertilised flowers. Tie one end firmly below the spray or bunch and the other end loosely above.

The note book will be required for noting all experiments. B or BB pencils are better than pen and ink as any damp may cause the ink to run.

Botanical Terms.—

These few botanical terms will require explanation as they apply to the parts of the flower dealt with.

The *Calyx* is composed of *Sepals* which constitute the outer covering of the bud. The Sepals are usually green and from three to five in number.

The *Corolla* is the term applied to the *Petals* collectively, these constitute the coloured leaves of the flower.

Inside the Corolla are the *Stamens* or male organs which consist of the *Filament* and *Anther*. The filament is the stalk supporting the sac-like body called the anther, which is filled with pollen.

Pollen is the fine dust-like substance contained in the anthers and varies in colour from yellow, orange, brick-red, to purple, violet and white but is never either a true blue or green.

The *Pistil* or female organ, occupies the centre of the flower and is made up of the *Stigma*, which is the viscid or papillose tip and the *Style* or tube which below swells into the *ovary* or chamber containing the ovules.

Insect Pests.—

It should be noticed whether the flowers are visited by ants, bees, butterflies, etc., for pollen grains are easily deposited on the stigma and the visit of an insect to the flower may neutralise the intended result. There is the black garden ant, the tiny red one that bites and another red variety which makes nests between the leaves by connecting them together with a silky paper-like substance. The black and tiny red ones usually have their nests in the ground and can be driven away by using kerosene oil, turmeric or tobacco in solution with water, powdered napthalene or turmeric will answer just as well. The nests of ants living on the plant itself will need to be removed.

The big black Carpenter bee is a source of great annoyance. He flounders about in the flower, not only destroying the pollen but the flower itself. Butterflies, flies, honeybees and moths also prevent hybridising, therefore it will be necessary to enclose the flower or branch in a light muslin or net bag.

The green grasshopper, which pays nocturnal visits to Crinum and other lilies, has to be guarded against, as well as the pretty black caterpillar with orange and white spots whose voracious appetite seems only satisfied with the choicest lilies. The bag must be used for grasshoppers, but the caterpillars require to be picked by hand. The latter appear at regular seasons of the year at the commencement and close of the rains, suddenly and in great numbers.

In addition to these insect pests the Elements will have to be reckoned with. Wind and rain may often destroy experiments, the former being a great factor in pollen distribution but its influence can be neutralised by removing all foreign pollen in the vicinity on contiguous blooms.

To avoid disappointment it would be as well to adopt the "prevention better than cure" motto. Bag and Tag

every attempt and if possible note time and pollen parent. Use mosquito net or muslin bags as directed, the covering need be kept on only for two or three days as in most instances the flower fades and the stigma loses the power of adhesion after that period. During the rains protect the bagged flower by making a rough umbrella out of any odd piece of tin, nail the tin on to a strip of bamboo and tie the bamboo to the stem or branch so as to protect the flower under experiment.

Remember damp pollen is dead pollen. Fresh pollen should always be used, but if it is found necessary to preserve pollen for a few days, keep it in a wide mouthed air-tight bottle in a cool place.

Cleanliness is essential in hybridising. Carefully sterilise the fingers and forceps with Methylated spirits after each operation so as to kill all foreign pollen that may have adhered to the fingers or instruments. Operations must be commenced before the honey bees have robbed the flower of the pollen and damaged the stigma, that is if the flowers have not been bagged the previous evening. By adopting this simple expedient of Emasculating (*i.e.*, removing the unopened anthers from the flower to prevent indiscriminate pollination) and bagging, the pollen can be transferred from the pollen parent to the female organs a couple of hours later. However, it will be as well to perform the operation before the sun gets too high; many flowers possess delicate stigmas and these shrivel up and become useless in the heat. In most cases when the stigmatic surface is viscid or glutinous and the pollen adheres readily when dusted on, it shews that the flower is ripe for pollinating.

The actual operation of hybridising is simple enough, it is the care before and after that requires patience and watchfulness.

Hybridising, Explanatory.—To many it is a puzzle how the pollen does its work and the hybrid comes about. The

stigma which receives the pollen is usually coated with a viscid secretion at the moment pollination should take place. In some flowers this happens before, in others after, the anthers burst. Under this moist influence the outer skin of the pollen bursts and the fovilla, the true fecundating substance, in the form of a tube descends through the style until it reaches the ovarian chamber. The tube then enters through a minute opening in the ovule and the substance in the tube unites with the substance in the embryo sac of the ovule. After this union the embryo sac develops into the embryo which is contained within the mature seed.

Some flowers have a very minute stigma and that scarcely viscid, hence some means must be adopted to assist pollination. Moistening with pure honey has proved satisfactory but ants are attracted and in many instances pollen and honey are both devoured. If possible in such cases the stigmatic surface should be brought into close contact with the anthers and tied in position.

Some species have the sexes on separate individual plants, others in separate flowers but on the same plant, while in the great majority of cases both male and female organs are present in the same individual flower. On the evening previous to the opening of the flower which has been selected as the seed parent, carefully open the bud. In some flowers it may be necessary to destroy the corolla. Then remove the anthers and bag the flower. The removal of the corolla renders the flower inconspicuous and hence it is not readily visited by insects. The following morning take a ripe anther from the flower that has been selected as the male parent and with the forceps or the brush dust the pollen from it, onto the top of the stigma of the female parent, making certain that the stigmatic surface is receptive.

A large or small amount of pollen, according to the surface of the stigma will adhere. Shade from the direct

rays of the sun until the seed begins to swell remembering to tie the bag on again with its tag or piece of twine and ticket.

With few exceptions all flowers, no matter how small, can be fertilized by following the above instructions—allowing for shape, size of bloom and position of organs. For instance, in certain of the pea family, the keel of the flower must be either depressed or removed before emasculation can be effected.

When at all in doubt about the organs remove a flower from the plant and cut through it lengthwise, tracing the pistil upwards from the seed pod. This refers particularly to such flowers as Barringtonia, the Siris, Mimosa, etc., where the filaments are numerous and closely resemble the pistil.

When it is found difficult to remove the anthers owing to their number or some other reason, make a small cone of paper or take the corner off an envelope, cut a hole just large enough for the stigma to come through and slip the cone over the pistil. In this way emasculating such flowers as Hibiscus and other Malvaceæ will not be necessary.

In most flowers the organs, the filament crowned with the anther and the pistil are easily determined. Be careful when emasculating the flower not to touch the pistil as an injury to this organ destroys all hope of seed.

There are secrets in hybridising hence so many failures, therefore carefully read the following "tips" regarding certain flowers, which will be better understood by examining the flower named, and advance will be assured. It will be as well to remember at what hour a flower opens and to fertilise it at that time.

Nature employs her own agencies for ensuring the fertilising of flowers, unfortunately we cannot take advantage of these. The pollen of the Ixora remains attached to the

arms of the stigma until, under the influence of heat or natural expansion, these arms open slightly and allow a few pollen grains to drift in. The same applies to the majority of flowers and it is only by artificial methods that we can imitate nature and obtain hybridised seed.

Evening and Night Flowering Plants.- Brunsfelsia, certain Cacti, Cestrum (the lady of the night) Clerodendron, Crinum, Franciscea, Ipomea Bona-nox, and many others open late in the evening or at night and it would be worse than useless to fertilise them next morning, as the stigma would then have lost it's power to absorb pollen. Cooperia and Mirabilis (Marvel of Peru) open early in the afternoon and must be taken in hand then.

Bignoniaceæ and Rubiaceæ.—In some genera, Bignonia, Ixora, Pentas and Tecoma for instance, the two lips or arms of the stigma will have to be gently separated to allow the pollen to come in contact with the stigmatic surface. In Ixora the pollen is often found sticking to the closed arms of the freshly opened flower, this should be gently brushed off.

Euphorbia (Poinsettia).—In Euphorbia and Poinsettia the pistil appears after the anthers on the button-like flower. Hybridise the much divided stigma as soon as it comes above the cup like involucre but before the ovary appears. Ants will be found most annoying and troublesome with Poinsettia.

Aroideæ.—In the Aroideæ the individual flowers are very small and crowded on the surface of an erect column, the spadix, while there is usually a coloured spathe or sheath. In some Aroideæ the female flowers are massed together on the lower portion of the column and the male flowers on the upper part. This occurs in the genera Alocasia, Colocasia, Caladium and Dieffenbachia. In such instances to prevent the pollen from falling on to the pistils of the same flowers, wrap a strip of calico gently round the upper

portion of the spadix before the staminate flowers open. It is unadvisable to attempt to remove the male flowers as the spadix might be damaged in so doing.

When the tips of the female flowers on the lower part of the spadix are viscid, pollen can be applied from another plant.

In other Aroideæ the male and female flowers are not distinctly separated on the column but mixed up along the whole length. In such cases the female flowers will be ripe before the male ones and may be detected by the clammy feel and aromatic odour of the spadix. In pollinating the female flowers, the pollen should be taken from an older flower of another variety and will appear on the spadix as tiny pin-head like points, white in colour.

Cooperia.—The anthers of Cooperia burst long before the bud opens and naturally the stigma is self fertilised. To avoid this, the bud should be carefully cut open at least 36 hours before the flower is expected to open and the anthers extracted, hybridsing with the pollen of any of the Zephyranthes, as there are no coloured forms of Cooperia.

Aristolochieæ.—In Aristolochia, by carefully removing the inflated tube, the stigma will be found with the six stamens cohering round it, but as the anthers burst some time after the sun is high, the flower does not need to be bagged previously. The pollen from a flower which opened the day previous should be used or fresh pollen of a ripe anther carefully dissected. The flies which are nearly always found inside an open flower are attracted by the fœtid odour.

In some species of flower, the Periwinkle and Pentas for instance, the stigma is within the tube of the flower and this will have to be exposed by splitting open the flower while yet in bud and at the same time removing the anthers.

Compositeæ.—The Aster, Cosmos, Helianthus and Zinnia

are very difficult to hybridise. These are only four genera of this large family which have been experimented with, but all the genera must be as difficult. The type in which each floret is unisexual can be dealt with in the ordinary way, *i.e.*, applying the pollen from one flower to the stigma of another. But where the flower contains both male and female organs in the same floret, emasculating will be necessary. This is a very delicate operation especially as the style appears within the cyclindrical ring of 5 united anthers. Remove the anthers by taking a firm hold of the upper end of the ring with the forceps and pulling it upwards.

The individual flowers, or florets as they are called in the Compositeæ, are collected in a dense head upon a common receptable; these florets open in concentric circles inwards and when the innermost have opened the flower fades.

Owing to such difficulties the simple expedient of planting two different species close together and allowing insect and wind agency to do the rest is usually resorted to.

Canna.—The Canna is one of the simplest subjects; it will be noticed that in addition to the three petals and lip there is a petal generally called the standard and a flat sword-like style. The single anther is borne on the margin of the standard and when the flower opens the pollen mass will be noticed usually fixed to the style below the stigma Remove the pollen and place it on the stigma of the flower intended to produce seed.

Croton, Begonia, Castor Oil Plant.—There are a few plants which have the pistillate and staminate flowers on separate bunches. These can be easily recognised and fertilised in the usual way. It is always advisable in connection with flowers produced in long sprays, to fertilise those opening first as these are the strongest. Should the first six set to seed leave the remainder unfertilised, or remove them carefully, so as to give greater vigour to the seed.

Apocynaceæ.—In Oleander, Plumeria, Beaumontia and other Apocynaceæ, the stigma is covered with a tent-like structure formed by the anthers. Carefully cut through the corolla tube on one side and remove the anthers; as a good deal of milky juice will exude use cotton wool for absorbing it.

Maranta.—The method of pollinating employed by Maranta is very remarkable. The flower has two large petals and a smaller petaloid filament, with the anther attached. When the flower opens the pistil is held back by two small hooded petals. The moment a bee enters and attempts to rob the nectary, down comes the pistil column and hits the insect, depositing pollen on its back. Should the bee have already visited a flower and received a burden of pollen, as it extricates itself from the trap the insect will leave the pollen behind on the stigma, which is placed on a column very similar to that of an orchid. To fertilise the flower press a pencil or thin stick toward the nectary, this will cause the column to fall, when the pollen can be applied.

Orchideæ.—Orchid hybridisation is not often practised in this country, but there is no reason why, with a little care, seedlings could not be raised. There is this one point however against hybridising an orchid, the severe strain of bearing seed usually weakens the mother plant and it takes two to three years before the plant recovers properly. Extract the pollen masses, which will be found protected by a cover, from the top of the column with a pointed stick and place within the pouch-like opening further down the stigma, which will be found coated with a sticky substance. The masses will readily adhere. Only fertilise two flowers in a bunch or in the case of Vanilla, six. Shortly after fertilisation has taken place the floral envelope commences to fade while under natural conditions the flower would have remained open for several days. The pod swells very gradually and after six to nine months it will start turning

yellow. A piece of tissue paper should now be wrapped or tied round the pod to save the seed from being lost, for when the pod is ripe the fine dust-like seed is exposed on a cottony substance and soon blown away.

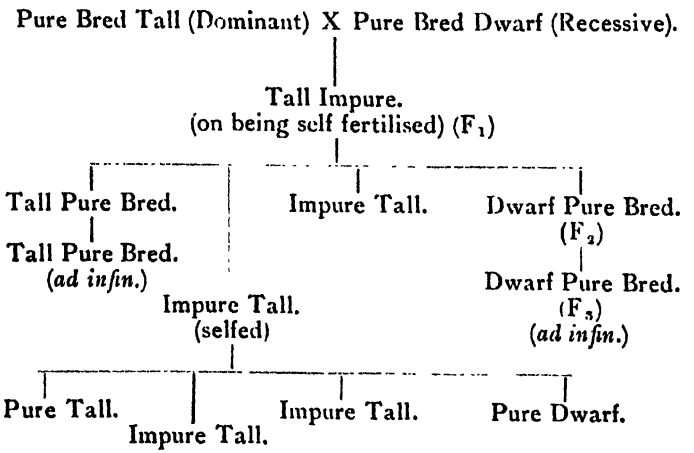
Ferns.—One should hardly be correct in saying that ferns can be hybridised, though intermediate forms originate when the spores of two species are sown together. Prepare a bed of cinders firmly pressed down and lay pieces of old mortar, masonry or roof rubbish on this, wet thoroughly and place your fern leaves with the sori or seed-side downwards one upon another or better still sow only the spores from freshly ripened sori. The undersurface of all fertile fronds of ferns have small pouch-shaped appendages called sori, containing the spores. This fructification is usually arranged in clusters and when ripe assumes a brownish look and bursts. The spores resemble pollen grains very closely and when germination commences a small leaf called the prothalium forms with roots on the undersurface and from this developes the fern.

Ferns practically flower at the prothallus stage when organs corresponding to stamens and pistil are formed. Under favourable conditions—a sufficiency of water—fertilisation takes place and if the sori are in close juxtaposition an hybrid might be produced.

Mendelism—Gregor Mendel (1822-1884) Abbot of Brunn, while conducting experiments with the edible pea discovered some wonderful facts, the sexual laws under which Nature worked. When he crossed tall peas with dwarf peas, no matter which was the pollen producing and which the seed bearing parent, the result was always the same, he got only tall plants. For this reason he applied the term Dominant to the tall and Recessive to the Dwarf.

In the first generation (F 1) he obtained from tall crossed with dwarf only tall, but in the second generation (F 2) the plants being self fertilised, or "selfed" as it is generally

known, the proportion was 3 : 1 for tall and dwarf, *i.e.*, three dominants or tall plants to one dwarf or recessive. In the third generation (F 3) the dwarf bred true or gave all dwarf plants always afterwards while the tall gave two tall impure to one pure tall, *i.e.*, the impure tall on being selfed gave a mixed progeny of tall and dwarf in the proportion of 3 : 1. A compromise in some instances produces a medium factor. It has been found that form and shape are usually inherited from seed parent and colour from pollen bearer. Mendel's Theory is better explained by the accompanying diagram :—



This same theory was proved correct when purple and and white flowered peas were experimented with, or smooth seeded and wrinkled varieties. For instance, a flower of good form but defective in colour can be crossed with one which, though faulty in shape, has the desirable shade, with the result that the combination of the desired characters is assured in the third generation. Then again a weak variety may be strengthened by union with a more robust type.

Mendelism can only be worked out correctly by the use of pure bred parents must be used if

seedlings conforming to Mendel's law are expected. When hybridising with compound characters many complications will arise but it must be remembered that one set of dominant characters true for sweet pea for instance, will not be epually true for roses. There are many books on Mendelism and the beginner is advised to refer to such for fuller information on this subject. P. C. Punnett on Mendelism or Professor Bateson's Genetics are recommended.

In closing these notes on hybridising it is advised: -

(1) That strong healthy parents be chosen for experiments. A weak seed producing or pollen-bearing parent might produce seed, but the progeny will certainly be weak and probably perish before they reach maturity.

(2) Save seed from all hybrid plants and sow separately, label each plant resulting and watch all carefully. Those plants that can be propagated by division or cutting need not be bred true. It is also suggested that the beginner make only a few hybrids at a time unless he has space to devote to all resultant forms which must occur between two plants.

(3) Hybridise like with like, not a rose with a cornflower and expect a blue rose! Look up a botanical family, the Compositeæ for instance, and the different genera, and hybridise in that family. In this connection it will perhaps be as well to keep a catalogue or list of plants in which the Natural Orders and genera of plants are given.

A NEW RUBBER PLANT.

The Mexican Department of Agriculture announces a fresh source of rubber supply, viz., the red *Plumeria* or *Cacalosochilt*, as the plant is called by natives. All the known Mexican members of this family have a milky sap,

but the red Plumeria is the only one yielding caoutchouc in sufficient quantities to make its collection worthwhile. The stem of the tree is 6ft. to 15ft. in height, and 8in. to 24in. in circumference; the bark is thick and bright grey in colour.

The tree is widely distributed over Mexico and Central America, and favours a sandy or rocky soil, altitudes between 1,000 and 5,000ft., and dry localities where the annual rainfall averages from 27 to 45in. Propagation is effected by cuttings, and tapping may be commenced when trees are three years old. Since the young wood contains most caoutchouc, the latter is collected not by tapping the bark, but by pruning the young shoots, and recovering the sap from the pieces cut away. The life of the tree is not curtailed by this treatment. On the other hand, if pruning be performed judiciously, the number of young shoots can be multiplied almost indefinitely. The twigs and shoots removed contain about 4 per cent. of a caoutchouc comparing very favourably with the grades now on the market, and having the following analysis: Resin, 21.9 per cent.: water, 15·07 per cent.; caoutchouc, 25.5 per cent.

CONVERSION TABLES.

LENGTH.

French.		Inches.	Feet.	Yards.
Millimètre =	$\frac{1}{1000}$ mètre ...	0·039	.....	.....
Centimètre =	$\frac{1}{100}$ mètre ...	0·39	. ...	.....
Decimètre =	$\frac{1}{10}$ mètre ...	3·93	0·32	.....
Mètre ...	... ...	39·37	3·28	1·09
Decimètre =	10 mètres ...	393·70	32·80	10·93
Hectomètre =	100 mètres ...	3937·07	328·08	109·36
Kilomètre =	1000 mètres ...	39370·7	3280·8	1093·6
Myriamètre =	10,000 mètres ...	393707·	32808·	10936·3

WEIGHT.

		Grains	Ounces.	Pounds.
Milligramme =	$\frac{1}{1000}$ gram.	0·015	.....	.....
Centigramme =	$\frac{1}{100}$ "	0·15	.....	.....
Decigramme =	$\frac{1}{10}$ "	1·54	.....	.....
Gramme ... =	"	15·43	.....	.....
Decagramme =	10 grams.	154·32	0·35	.....
Hectogramme =	100 "	1543·25	3·52	0·22
Kilogramme =	1000 "	15432·5	35·27	2·20
		Lbs	Cwt.	Tons.
Quintal =	100 kilogrammes	220·4	1·96	.....
Millier =	1000 "	2204·	19·68	0·98

NERVOUS IMPULSE IN PLANTS.

A lecture delivered at the New Physical Laboratory, Presidency College, Calcutta.

On the 5th September, Professor J. C. Bose addressed a large audience of both European and Indian gentlemen presided over by H. E. Lord Carmichael.

The lecturer introduced his subject by referring to the various theories connected with the well known movement of the sensitive plant (Mimosa pudica) which closes it's leaflets at the slightest touch. Ten years ago he made the discovery that all plants possessed nerves and taking Mimosa pudica for his experiments shewed that this plant did not merely depend on hydraulic power for movement.

His views however had not been accepted by the Royal Society in England and he had been requested to produce further proof of his discovery. This he had now succeeded in doing and had convinced even the most sceptical.

Professor Bose pointed out some of the differences which exist, or I should rather say, had been supposed to exist, between plant and animal life.

The former in most instances remains passive in spite of shocks and blows while animal life always responds by some movement or other. Certain tissues of the animal keep on beating without any apparent cause and drugs have different effects on their movements: plant life on the contrary showed no corresponding phenomenon.

Animal life could be irritated by a current of electricity, but plants seemed to possess no excitement.

The animal system was closely connected by a network of nerves but eminent authorities declared that no such thing as a nervous system existed in plants.

Professor Bose then stated how in previous papers, as well as in a book recently published by Messrs. Longmans, he had shewn that all plants in a more or less degree were sensitive. Certain plants even possessing a movement of tissue corresponding to the heart beat of the animal and being also affected by drugs.

In the sensitive plant for instance, the fall of the leaf when struck had been regarded as a hydro-mechanical movement, *i.e.*, the touch squeezed the tissue containing water thus delivering a blow on the contractile organ at the base of the leaf and causing it to fall.

To prove the opposite the lecturer explained his experiments and exactly how he distinguished between nervous and hydro-mechanical movement.

Heat quickens while cold depresses ultimately arresting the nervous impulses. Drugs and Anaesthetics paralyse the nerves in different ways while a weak electric current causes a temporary block to the system. All these agencies however have absolutely no effect on water in a tube

except when excessive cold makes the water frozen. By a series of slides Professor Bose explained his points.

An eminent German physiologist, Pfeffer, applied chloroform to the stem of the Mimosa but his results seemed to prove the absence of any nervous system as there was no appreciable difference in movement. This was explained away by the lecturer who pointed out that that particular portion of the tissue containing the nerves is right in the interior of the stem and chloroform would need to penetrate very deep indeed before it could affect these nerves.

Twelve different and independent methods were employed on the Mimosa and all supported this conclusion, that there did exist a nervous system.

Professor Bose's greatest difficulty had been to record automatically the speed at which the nervous impression was conveyed under various conditions. Several methods had failed but he had at last succeeded through a wonderful instrument which he had called the Resonant Recorder. It was nothing more than an artifical ear tuned to one special musical note, the drum being composed of a thin soap film. When a beam of light was passed through this film a lovely combination of green and gold was projected on the screen. This remained unaltered though several notes were struck but the change was very noticable as soon as the particular note was sounded; the pattern immediately became disturbed forming a regular whirlpool of colour.

The Recorder has a writing pen tuned in the same way to a particular note which vibrates it in sympathy. This pen is attached to a lever which in its turn is connected to a leaf of the Mimosa. When the reed is sounded an electric shock is simultaneously given to the plant and a record of the speed is marked off on a smoked glass by a series of dots at regular intervals, these stopping as the leaf falls to its furthest extent when the record is switched off. A couple of records were made to illustrate the text.

The instrument is able to measure up to one thousandth part of the duration of a heart-beat an almost incredible performance ; it has also recorded the time it takes for a given blow to be responded to by the plant, this works out to 6 one hundredth parts of a second, very nearly the exact period taken by the frog's muscles.

A curious feature of the Mimosa is that a strong healthy plant does not answer to movement as quickly as a weaker looking one while it will become sluggish under constant movement unless given a period of rest. It was also shewn that under various conditions plants act differently : for instance a Mimosa grown under glass though perfectly healthy in appearance failed to respond but when treated to a succession of blows the system which seemed to be asleep recovered its normal condition.

With a rise of temperature the movement was quickened while cold depressed and finally completely stopped the impulse. This frozen condition lasted normally for about an hour but could be dispelled by moderate shocks of electricity in a short while.

The application of poisonous drugs also paralysed the conductive power in various degrees.

A weak current of electricity was passed through a dead fish which responded vigorously : the Mimosa leaf was next connected to the terminals and the leaf dropped when the circuit was completed.

In conclusion the lecturer pointed out how plant life had been made to exhibit many of the activities of animal life thus proving conclusively that plant life possessed all the more complex parts of animal life. Professor Bose illustrated his lecture with many diagrams and experiments making the already fascinating subject more interesting and one left the Hall feeling another stride had been taken in the direction of including plants among the animate creation.

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